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ABSTRACT

This core curriculum guide consists of materials for use in presenting a 13-unit vocational agriculture course geared toward high school students living in metropolitan areas. Addressed in the individual units of the course are the following topics: employment in agricultural occupations, supervised occupational experience, leadership in horticulture and in agriculture, horticulture and agricultural mechanics, plant propagation, plant identification, horticultural-crop management, horticultural-plant pest control, urban animals, soil science and conservation of natural resources, horticultural and agricultural products, landscape design and maintenance, retail floriculture, and horticulture business management. Each unit contains some or all of the following: suggestions to the teacher, a teacher's guide, information sheets, student worksheets and a teacher's key, transparencies, a discussion guide for the transparencies, and sample test questions along with a teacher's key. (MN)

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CORE IV MATERIALS
FOR METROPOLITAN
AGRICULTURE
PROGRAMS

Project Staff

Co-directors:
Earl B. Russell
Roger L. Courson

Developers:
Paul E. Hemp
Janet L. Henderson
Kallie S. Grcbstein
Teresa E. Paniello
Susie Osborne

Department of
Vocational and
Technical Education
and Vocational
Agriculture Service,
University of Illinois
at Urbana-Champaign

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Address 1310 S. Sixth St., Champaign, IL Zip Code 61820

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____ 03 Business and Office Education
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____ 09 Home Economics Education
____ 10 Industrial Art Education
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____ 7-8
____ 9-10
__X__ 11-12
____ Post-Secondary
____ Adult
____ Teacher (Pre-Service)
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Department of Adult, Vocational and Technical Education
Research and Development Section, E-426
100 North First Street
Springfield, IL 62777
(217)782-4620

16. General Description:

This curriculum guide includes teaching packets for 24 problem areas selected as suggested areas of study to be included in a core curriculum for twelfth-grade or fourth-year students enrolled in a rural agriculture program.

17. Person Completing this Abstract: Earl B. Russell

Full Address: 357 Education Bldg.
1310 S. Sixth St.
Champaign, IL 61820

SUGGESTIONS FOR USING CORE IV MATERIALS

These instructional materials and teaching aids have been designed to improve instruction and increase student learning. Each problem area includes some or all of the following components.

1. Suggestions to the teacher
2. Teacher's guide
3. Information sheets
4. Student worksheets and teacher's key
5. Transparencies
6. Discussion guide for transparencies
7. Sample test questions and teacher's key

This combination of instructional materials should be utilized as a source unit. This means that teachers should selectively choose those components and parts which they need to achieve their teaching objectives. The project staff does not recommend that teachers "teach" the core program as it is presented. Instead, the teacher should personalize and localize the materials for the group taught and, wherever possible, add other materials and teaching techniques to enrich the core program.

Teachers could teach everything included in the core curriculum, but this would not be advisable considering the variations which exist in vocational agriculture programs, students' needs and interests, and program objectives. Instead, teachers should select problem areas for a "local core" and supplement them with other problem areas important in the local area. Another suggestion is that the entire problem area need not be taught to a given group during a given year. For example, instructors may want to teach part of the horticultural marketing problem area to a beginning class and teach the remaining part to an advanced class.

Specific suggestions for using the difference components of a problem area packet are presented in the following section.

1. Suggestions to the teacher. These suggestions are included on the first page of each problem area. Teachers should read these suggestions before problem areas are scheduled for the year. Decisions need to be made regarding which problem areas will be taught, when they will be taught, and the approximate number of days to be devoted to each problem area. On the basis of these decisions, teachers can construct a course calendar. In some cases, the suggestions also indicate the preplanning that needs to be accomplished before instruction begins. Instructional materials not included in the core need to be ordered in advance.

2. Teacher's guide. The teacher's guide is not a lesson plan. It is a source of teaching ideas which may be implemented by the agriculture teacher to conduct an effective instructional program. Each guide includes more material than most teachers would use. Teachers should select from the several interest approaches and teaching activities those suggestions which seem most appropriate for the local situation. The teacher's guide emphasizes a problem-solving method and a student-centered activity approach. Lecture-presentation, rote memorization of facts, and subject matter mastery should be kept to a minimum. The teacher's guide includes suggestions for carrying learning to the "doing" level. Application of classroom learning to SOEP's and FFA activities is an important part of the teaching process.

3. Information sheets. These sheets have been prepared for those problem areas where subject matter may be difficult to locate. If reference materials are not available, the teacher may want to duplicate copies of the information sheets for class use.

4. Student worksheets and teacher keys. These exercises are designd as classroom activities for student use. They may provide a change of pace for students when they have grown tired of other activities which may be overused. Most exercises include a teacher's key with suggested answers.

5. Transparencies. Some of the problem areas include transparency masters which can be used to prepare overlays.

6. Discussion guide for transparencies. Most of the transparencies included in the core materials do not include on the overlay any narration or explanation. The discussion guide provides teachers with some suggested points to bring out in the discussion of a transparency including explanations, descriptions, and discussion questions related to the transparency.

7. Sample test questions and teacher's key. The sample test questions are not intended to be used as a test. The teacher can select questions from those included in the problem area if they are appropriate and add others as needed. Some teachers may choose not to administer a test at the close of each problem area and to prepare a comprehensive test at the end of a unit.

The numbering system found at the bottom of each page includes four digits or letters. The first number is a Roman numeral IV which stands for Core IV. The letters which run from A-N designate the unit. The third character is a numeral which indicates the problem area within the unit (1 means first, 2 for second, etc.). The last digit is the page number. All pages are numbered consecutively and the pages in each problem area start with "one."

The color scheme used in the Illinois Core Curriculum IV is as follows:

Salmon--Suggestions to the teacher
Tan--Teacher's guide
Light Blue--Information sheets
Ivory--Student worksheets
Lime--Teacher's key to student worksheets
White--Transparencies and transparency discussion guides
Green--Sample test questions and teacher's key
Raspberry--Introductory sheets

LIST OF UNITS AND PROBLEM AREAS

METROPOLITAN AGRICULTURE PROGRAM

CORE IV

UNIT A: Orientation to Agricultural Occupations

PROBLEM AREA:

1. Maintaining employment.

UNIT B: Supervised Occupational Experience

UNIT C: Leadership in Horticulture/Agriculture

UNIT D: Horticultural/Agricultural Mechanics

PROBLEM AREA:

1. Operating, maintaining, and servicing lawn and garden equipment.

UNIT E: Plant Propagation

PROBLEM AREA:

1. Propagating by tissue culture.

UNIT F: Plant Identification

UNIT G: Growing and Managing Horticultural Crops

PROBLEM AREA:

1. Developing crop growing schedules.

UNIT H: Identifying and Controlling Pests of Horticultural Plants

UNIT I: Urban Animals

UNIT J: Soil Science and Conservation of Natural Resources

PROBLEM AREA:

1. Growing plants hydroponically.

UNIT K: Horticultural/Agricultural Products

UNIT L: Landscape Design, Establishment, and Maintenance

PROBLEM AREAS:

1. Pruning deciduous shrubs.
2. Pruning deciduous shade trees.
3. Pruning bonsai, espalier, topiary, vines and roses.
4. Using mulches in the landscape.
5. Growing plants in containers.

UNIT M: Retail Floriculture

PROBLEM AREAS:

1. Designing silk and dried arrangements.
2. Designing wedding arrangements.
3. Designing funeral arrangements.
4. Designing holiday arrangements.
5. Designing dishgardens and terrariums.
6. Operating a retail flower shop.

UNIT N: Horticulture Business Management

PROBLEM AREAS:

1. Understanding the four common ways of organizing a business.
2. Selling horticultural products.
3. Marketing horticultural products.
4. Utilizing microcomputers in horticulture business management.

METROPOLITAN AGRICULTURE PROGRAM ADVISORY COMMITTEE

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Emiel Hamberlin
DuSable High School

Carl Reed
Barrington High School

Louis Schairer
District 214

Pamela Wolfe
Willowbrook High School

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Some of the problem areas included in the Metropolitan Core IV were reviewed by the following persons.

1. Operating, Maintaining, and Servicing Lawn and Garden Equipment

   Mr. Craig Theimer, Rochelle High School

2. Developing Crop Growing Schedules

   Dr. Jim Ethridge, Joliet Junior College
   Mr. Carl Reed, Barrington High School

3. Growing Plants Hydroponically

   Mr. Ron Biondo, WILCO Area Vocational Center

4. Pruning Deciduous Shrubs

   Mr. Mike Tierney, John Marshall High School

5. Pruning Deciduous Shade Trees

   Dr. Jim Ethridge, Joliet Junior College
   Mr. Mike Tierney, John Marshall High School

6. Pruning Bonsai, Espalier, Topiary, Vines, and Roses

   Mr. Ron Biondo, WILCO Area Vocational Center
   Dr. Jim Ethridge, Joliet Junior College

7. Using Mulches in the Landscape

   Mr. Ron Biondo, WILCO Area Vocational Center
   Mr. Carl Reed, Barrington High School

8. Designing Silk and Dried Arrangements

   Mr. Craig Theimer, Rochelle High School

9. Designing Wedding Arrangements

   Dr. Jim Ethridge, Joliet Junior College
   Ms. Pam Wolfe, Willowbrook High School

10. Designing Dish Gardens and Terrariums

    Mr. Mike Tierney, John Marshall High School

11. Operating a Retail Flower Shop

    Dr. Jim Ethridge, Joliet Junior College

12. Understanding the Four Common Ways of Organizing a Business

    Mr. Craig Theimer, Rochelle High School

13. Selling Horticultural Products

    Mr. Craig Theimer, Rochelle High School

14. Marketing Horticultural Products

    Mr. Ron Biondo, WILCO Area Vocational Center

15. Utilizing Microcomputers in Horticulture Business Management

    Dr. Bill Hunter, Vocational Agriculture Service
    Mr. Carl Reed, Barrington High School

UNIT A: Orientation to Agricultural Occupations

PROBLEM AREA:

1. Maintaining employment

UNIT A: ORIENTATION TO AGRICULTURAL OCCUPATIONS

PROBLEM AREA: MAINTAINING EMPLOYMENT

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs who have obtained employment. The recommended time for teaching this problem area is during the winter months when few outdoor horticultural activities are available.

The instructional materials included in this problem area have been developed based on the assumption that students have been instructed on how to seek and gain employment opportunities (see Metropolitan Core Curriculum III-Unit A). The estimated instructional time for this problem area is 5-10 days, depending on the skills the teacher wishes to develop. Instructors should reinforce these skills throughout the school year as students work and communicate with each other in classroom and laboratory settings. Supervised occupational experience programs also provide an excellent opportunity for instructors to reinforce communication, personality and responsibility skills on a one-to-one basis with students.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's quide, information sheets, student worksheets, laboratory exercise, transparency discussion guide, and test questions were developed by Susie Oborne, Department of Vocational and Technical Education, University of Illinois and reviewed by Paul E. Hemp, Janet L. Henderson, Teresa E. Paniello, and Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois. Information for Student Worksheets 2 and 3 were obtained from the Oklahoma Basic Core Curriculum III.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Orientation to agricultural occupations

II. Problem Area: Maintaining employment

III. Objectives: At the close of this problem area, students will be able to:

1. Define human relations.
2. Identify and practice methods of utilizing human relations skills necessary to maintain employment.
3. List and practice skills essential in developing a positive working relationship with employers, supervisors, co-workers and customers.
4. Utilize written, verbal, and non-verbal communication skills necessary to maintain employment.

IV. Suggested interest approaches:

1. Ask students if they have ever heard or said, "There is something about him/her that really bothers me." Have students give examples of how someone may have "bothered" them and explain how they thought the person should have acted differently.
2. Have students provide examples of times they went shopping but did not make a purchase because of something the salesperson did. Discuss how the salesperson should have acted.
3. Divide the class into small groups. Assign each group with a specific position in agribusiness (e.g., employer, employee, or customer). Have the groups discuss what they expect from the other position/group (e.g., What does the employer expect from the employee? What does the customer expect from the employee?).

V. Anticipated problems and concerns of students:

1. What is human relations?
2. Once I have a job how can practicing human relations skills help me keep it?
3. How can I develop and use human relations skills properly?
4. Why do most people lose their jobs?
5. How do we communicate with others?
6. How can I improve my communications skills?

7. How can I leave a positive impression on my employee, co-workers, and customers?

8. What is the proper way to write a business letter?

VI. Suggested learning activities and experiences:

1. Use Metropolitan Core Curriculum III, Unit A, Problem Area - Gaining Employment to review the personal characteristics desirable for gaining and maintaining employment.

2. Invite resource persons from local businesses to discuss the importance of utilizing human relations skills on the job.

3. Allow students ten minutes to write what they think morale is and how it can be improved. Read several of these reports aloud and discuss why morale is important in the job setting and how it can be improved.

4. Divide the class into small groups. Assign each group a situation that might occur on the job. Have the groups discuss what should be done and report to the entire class. Examples of situations include handling an irate customer, seeing a fellow employee steal something from the business, insubordination, taking too many breaks, etc.

5. Have students visit a horticultural business to observe ten positive and ten negative aspects of human relations skills on the job. Have students report their observations to the class using Student Worksheet 1 - Human Relations Analysis of an Agribusiness as a guide.

6. Conduct laboratory exercises as a simulated job experience assigning one student as the supervisor and the others as workers for a one week period. A different student should be the supervisor each day of the week. At the end of the week discuss the human relations skills displayed by the employees and various supervisors.

7. Conduct various role play sessions demonstrating positive and negative aspects of verbal and non-verbal communication on the job. Role play examples include discussions between employer and employee, employee and customer or employee and employee. These sessions could be videotaped and analyzed by other classes.

8. Using Information Sheet 1 - Writing a Business Letter have students write a business letter. Refer to VAS Unit 6003 - Human Relations in Agricultural Business for a sample letter.

9. Have students select a horticultural occupation they are interested in pursuing and describe the human relations skills that would be most important for success in the occupation.

10. Conduct the communication exercise described in Laboratory Exercise 1 - Practice in Oral Communication.

11. Have students read VAS Subject Matter Unit 6016 - Motivating Workers in an Agricultural Business. Discuss the importance of being motivated on the job.

12. Have students write reports on magazine articles describing new developments in horticulture and present them to the class.

13. Have students role play various situations such as making introductions, telephone communication, or handshaking procedures.

14. Have students read an article and record their voices. Analyze the recording for proper voice qualities.

15. Have students practice making introductions using the guidelines in VAS Subject Matter Unit 6003 - Human Relations in Agricultural Business.

16. Have students complete Student Worksheets 2 and 3 to analyze their ability to get along with others and improve personal habits associated with job success.

VII. Application procedures:

1. This problem area will enable students to evaluate and change personal human relations and communications skills necessary in maintaining employment.

2. This problem area will help students excel and advance in the job market.

VIII. Evaluation:

1. Students should be evaluated for human relations skills on a continual basis in both the classroom and laboratory settings.

2. Prepare and administer a written exam using the sample test questions in this problem area.

3. Evaluate stuent worksheets laboratory exercises, written reports and business letters.

IX. References and aids:

1. Hilison, John and Crunkilton, John. Human Relations in Agribusiness. McGraw-Hill Inc., New York, NY, 1978.

2. Vocational Agriculture Service, Department of Agriculture, University of Illinois, 1401 Maryland Drive, Urbana, IL. 61801.

    a. VAS Subject Matter Unit 6003 - Human Relations in Agricultural Business.

    b. VAS Subject Matter Unit 6016 - Motivating Workers in an Agricultural Business.

    c. VAS Slidefilm 392 - Human Relations in Agricultural Business.

3. Illinois Metropolitan Core Curriculum III, Unit A, Problem Area-Gaining Employment.

4. Asbacher, Garland. Human Relations. Iowa Vo Ag Teachers Association, Iowa State University, Ames, Iowa, 1973.

INFORMATION SHEET 1

WRITING A BUSINESS LETTER

I. A business letter usually consists of the seven parts listed below. A sample business letter is given in VAS Subject Matter Unit 6003 - Human Relations in Agricultural Business.

A. Heading - where and when the letter was written.

B. Address - name and title of person to whom the letter is to be sent, name of business, street address, city, state, and zip code.

C. Salutation - greeting with which the message begins, use the persons name, not Dear Sir, Madam or Ms.

D. Body - material between the salutation at the beginning and the complimentary close at the end.

E. Complimentary Close - at the end of the body to indicate the message has been completed. The close should be simple, for example, "sincerely".

F. Signature - the name of the writer with his/her name typed directly below the signature, the written signature should be legible.

G. Signature Identification and Stenographic Reference - indicates who wrote the letter and who typed it.

II. Guidelines for Writing the Body of A Business Letter.

A. Tell what your letter is about in the first paragraph.

B. Write the letter from the reader's point of view. Be positive and natural. Write the way you talk.

C. Keep the letter short and to the point. Be specific.

D. Use good English. Use the active voice. Utilize more nouns and verbs. Eliminate unnecessary adjectives.

E. Make the letter attractive - no typographical errors, misspelled words or grammatical errors.

F. Edit carefully and throughly. Read your letter before sending it.

INFORMATION SHEET 2

TEN COMMANDMENTS OF GOOD LISTENING*

Nature gave humans two ears but only one tongue, which is a gentle hint that they should listen more than they talk.

1. STOP TALKING!

   You cannot listen if you are talking.
   Polonius (Hamlet): "Give every man thine ear, but few thy voice."

2. PUT THE TALKER AT EASE.

   Help them feel that they are free to talk.
   This is often called a "permissive environment."

3. SHOW THEM THAT YOU WANT TO LISTEN.

   Look and act interested. Do not read your mail while they talk. Listen to understand rather than to reply.

4. REMOVE DISTRACTIONS.

   Don't doodle, tap or shuffle papers.
   Will it be quieter if you shut the door?

5. EMPATHIZE WITH THEM.

   Try to put yourself in their place so that you can see their point of view.

6. BE PATIENT.

   Allow plenty of time. Do not interrupt them. Don't start for the door or walk away.

7. HOLD YOUR TEMPER.

   An angry person gets the wrong meaning from words.
   "They who anger you, conquer you."

8. GO EASY ON ARGUMENT AND CRITICISM.

   This puts them on the defensive. They may "clam up" or get angry. Do not argue; if you win, you lose.

9. ASK QUESTIONS.

This encourages them and shows you are listening. It helps to develop points further.

10. STOP TALKING!

This is first and last, because all other commandments depend on it. You just can't do a good listening job while you are talking.

*By Keith Davis, Professor of Management, Arizona State University

INFORMATION SHEET 3

METHODS OF COMMUNICATION

I. We communicate with others in three ways - the written message, the oral/verbal message and/or the non-verbal message. The major point to remember when communicating with others is to show respect and consideration and to listen to what others have to say.

II. The Written Message

   A. Letters

      1. Identify the purpose
      2. List ideas and facts to accomplish purpose
      3. Organize letter information

   B. Reports

      1. Introduction - briefly states what the report is about
      2. Main Body - explains the information obtained
      3. Conclusion - the writer's reaction to the report and a recap of the main body

III. The Oral/Verbal Message

   A. Direct Conversation

      1. Show respect and consideration for others
      2. Listen to what others say
      3. Contribute to the conversation
      4. Use proper english

   B. Presenting Reports

      1. Introduce the report
      2. Use visual aids to add to the presentation
      3. Give the conclusion with general comments on the information in the report

   C. Telephone

      I. Making calls

         a. Identify yourself
         b. State your reason for calling.
         c. Say "Thank you" and "You're welcome"

      II. Answering Phones

         a. Answer courteously and state your name and/or the business name
         b. Take messages by asking the name & phone number of the caller and write down the message

    c. Try to visualize the other person, be attentive and take time to be helpful

  D. Voice Qualities

    1. distinctness
    2. loudness
    3. expressiveness
    4. pitch
    5. speed
    6. pleasantness
    7. sincerity/naturalness
    8. stammering or hesitation
    9. friendly tone

IV. The Non-Verbal Message

  A. Body Language

    1. Gives reactions of boredom, surprise, sincerity and other feelings
    2. Can be used to measure reactions to conversations, speeches, and written messages
    3. Includes eye contact, facial expressions, hand and body movements, and vocal qualities

  B. Handshake

    1. Proper handshake is done with a firm grip and two short up and down shakes

    2. Improper Handshakes

      a. Ring squeezer and bone crusher
      b. Limp "dead-fish" hand
      c. Hand pumper and jerker
      d. Won't let go glue hand

V. Barriers to Good Communication

  A. Poor listening skills

  B. Misuse of Language - labeling, name-calling and emotionally loaded words

  C. Allness - belief that what is said is absolute, using words such as always, never, ever

  D. By passing - overlooking or forgetting a word that may have several different meanings

STUDENT WORKSHEET 1

HUMAN RELATIONS ANALYSIS OF AN AGRIBUSINESS

Name of Business________________________________Number of Employees____

Description of Business____

____

____

____

____

____

1. List the desirable personality traits you observed in the employees of this business.____
   ____
   ____
   ____
   ____

2. List the undesirable personality traits you observed in the employees of this business.____
   ____
   ____
   ____
   ____
   ____

3. Describe the physical appearance of the employees of this business. Could it be improved? If so, how?_____________________________
   ____
   ____
   ____
   ____

4. Describe positive and negative human relations you observed in regard to the following relationships in this busines.

A. Employer - Employee ____________________

B. Employee - Customer ____________________

C. Employee - Employee ____________________

5. How have proper human relations skills contributed to the success of the business? ____________________

STUDENT WORKSHEET 2

GETTING ALONG WITH OTHERS*

A successful person should know how to get along with others. By the results of this self-test, you will see how you are doing. Circle your answers.

1. You meet a person you immediately do not like. You would:

   a. Try to find a topic of conversation of common interest.
   b. Avoid the person.
   c. Try to put the person in her/his place.

2. You are offered a job for which you are not fitted. You would:

   a. Admit your inadequacy and offer to learn on the job.
   b. Refuse to try.
   c. Try to bluff through it.

3. When dealing with people, you:

   a. Usually smile and say something pleasant.
   b. Are nice if they are pleasant to you.
   c. Treat them impersonally.

4. You have been overcharged or undercharged in a store. You would:

   a. Ask the salesperson to recheck the bill.
   b. Pay the bill without saying anything.
   c. Tell the salesperson you have been cheated.

5. When you meet a person who is handicapped, you:

   a. Treat the person as you would anyone else.
   b. Go out of your way to be especially nice.
   c. Try to avoid the person.

6. A friend has just bought a suit which you think is unbecoming. He/she asks if you like it. You would say:

   a. "Yes, I like the color. Do you think the pants length should be changed?"
   b. "How's the weather today."
   c. "It looks terrible."

7. You honestly feel that you:

   a. Are interested in most people.
   b. Are really comfortable only with your own group.
   c. Are bored by most people.

8. In a store you are in no hurry, but the person after you is rushed. You:

    a. Suggest that the person go ahead of you.
    b. Make your selection because it is your turn.
    c. Take an extra long time just to calm the person.

9. When you meet people of different races or religions, you:

    a. Consider them as human beings much like yourself.
    b. Have a secret feeling of fear.
    c. Are convinced your way of life is superior.

10. After a picnic you find there is no trash basket. You would:

    a. Take the papers, bottles, and food home with you.
    b. Try to hide the trash on the property.
    c. Leave it on the ground.

Scoring

Give yourself 5 points for every "a" answer, 3 points for every "b" answer, and no points for "c" answers. Add up your score.

Analysis

35 to 50 points: You are very good in your relationship with others because you respect others and greet them with interest and courtesy. You are liked by your friends and those with whom you deal in a casual way.

18 to 34 points: You do very well with others most of the time, but you are sometimes self-centered and forget to put yourself in the other person's shoes. Try working toward more of those a answers, and you will find that living is more pleasant than it is now.

0 to 17 points: You are having trouble either because you are too shy or too aggressive. You know which! Good human relations are like anything else in life - they take practice. Select someone you admire. Analyze the person's actions; then, adapt those traits to your own personality.

*Information included in this worksheet was obtained from the Oklahoma Basic Core Curriculum III.

STUDENT WORKSHEET 3*

PERSONAL HABITS ASSOCIATED WITH JOB SUCCESS

Good habits are necessary in order to establish good human relations and a good relationship with co-workers, employer, and customers. Answer each question by circling YES or NO at the end of each question.

(NOTE: If you have not yet been employed, base your evaluation on "work situations" in classroom settings.)

CO-WORKERS (OR PEERS):

Do you do your own work and not leave it for someone else to do?	YES	NO
Do you clean up after yourself?	YES	NO
Are you willing to learn from others about how to do a job better?	YES	NO
Do you contribute to morale and team spirit at your place of business?	YES	NO
Do you learn names of people with whom you work as soon as possible?	YES	NO
Do you take a sincere interest in co-workers, their families, and their interests?	YES	NO
Are you a good listener?	YES	NO
Do you admit mistakes without making excuses?	YES	NO
Do you assume blame for things that are your fault?	YES	NO
Do you avoid gossip?	YES	NO
Do you support co-workers?	YES	NO

EMPLOYER (OR TEACHER):

Are you cheerful?	YES	NO
Do you feel your job is a privilege, not a right?	YES	NO
Do you try always to do the best you can?	YES	NO
Do you know your job?	YES	NO
Are you on the job unless excused?	YES	NO
Are you on time and ready to work?	YES	NO

(NOTE: Do a day's work for a day's pay!)

Do you try to avoid waste of all kinds (materials, time, equipment)?	YES	NO
Do you look for a better way to do the job?	YES	NO
Do you tell the truth and are you sincere?	YES	NO
Do you ask questions when you need help?	YES	NO
Do you try to see employer's side when there is a problem?	YES	NO

CUSTOMERS (OR ANYONE WITH WHOM YOU'RE WORKING):

Do you know what is expected of you and do you do your job well?	YES	NO
Do you give business-like treatment to customers?	YES	NO
Do you keep promises made to customers?	YES	NO
Are you polite to customers?	YES	NO
Do you recognize customers as buyers of your service and give them their money's worth?	YES	NO
Are you sincere?	YES	NO
Do you smile?	YES	NO
Are you friendly, interested, and sympathetic?	YES	NO
Do you gain the customer's confidence and listen?	YES	NO
Do you try not to rush the customer?	YES	NO
Do you avoid arguing with an angry customer?	YES	NO
Do you avoid comments that might upset a customer?	YES	NO
Do you refer matters which you can not handle to your supervisor?	YES	NO
Do you treat each customer as an individual?	YES	NO
Do you take pride in winning a customer's friendship?	YES	NO

1. What do you feel are your strengths in personal habits associated with job success?

____

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2. What do you feel are your weaknesses in personal habits associated with job success?

____

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*Information included in this worksheet was obtained from the Oklahoma Basic Core Curriculum III.

LABORATORY EXERCISE I

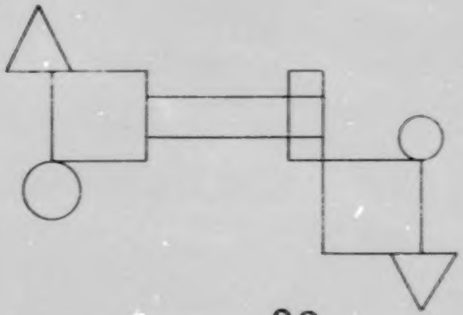
PRACTICE IN ORAL COMMUNICATION

PURPOSE: The purpose of this laboratory exercise is to help students identify problems in oral communication and determine methods to communicate effectively.

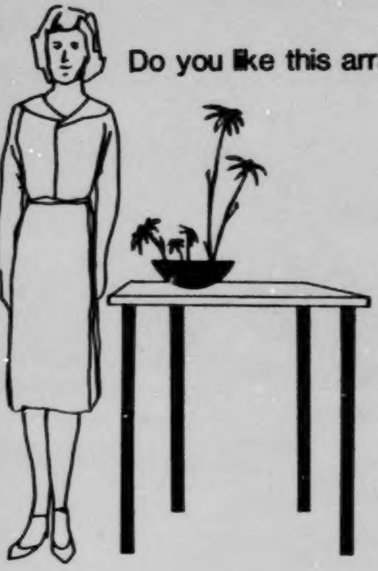
PROCEDURES:

1. Select a presenter and present him/her with the following diagram. Do not show the diagram to the group.
2. Have the presenter describe the diagram through oral means only.
3. Have the other students draw the diagram as they understand the presenter describing it.
4. Select a second presenter and repeat the first three steps of the procedure.
5. Have the students compare their drawings.
6. Have one or two students draw their sketches on the board. Compare the drawings with the original.
7. Answer the following questions:
    - a. How many drawings are the same as the original?
    - b. Is there a difference between the first and second sketches drawn?
    - c. Why are the drawings different from the original?
    - d. How could the drawings be improved if the presenter is not restricted?
    - e. Does everyone perceive what is said as the same?
    - f. How do communication problems affect the overall effectiveness of an agribusiness?

DIAGRAM:

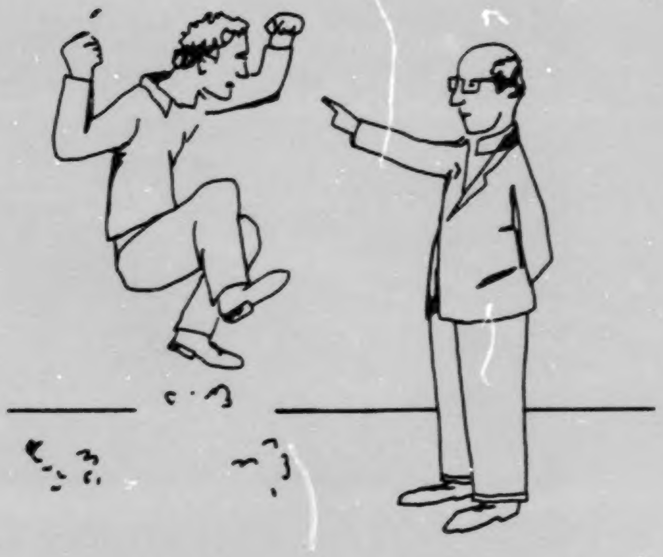


OUT OF EVERY 10 WORKERS WHO LOSE THEIR JOBS


Do you like this arrangement of roses?

ONLY 1 LACKS TECHNICAL KNOWLEDGE AND SKILLS

BUT 9 DO NOT KNOW HOW TO GET ALONG WITH PEOPLE



Essential Personality Traits for Job Success

1. Cooperativeness
2. Dependability
3. Courtesy/Tact
4. Enthusiasm
5. Initative
6. Honesty
7. Loyalty
8. Adaptability
9. Patience
10. Self-control

Human Relationships Means You

-Know yourself

-Work with people instead of against them

-React correctly in given situations

Undesirable Worker Traits

1. Complaining to everyone about everything
2. Being jealous of others
3. Gossiping
4. Being inconsiderate of others
5. Being an "apple-polisher"
6. Acting like a supervisor
7. Taking credit for the work and ideas of others
8. Using other people for personal gains
9. Using sick leave inappropriately
10. Being consistently late

Expectations of Employee

1. Respect for authority
2. Personal authority
3. Adherence to business rules and policies
4. Regular attendance
5. Proper personal characteristics (appearance and personality)
6. Acceptance and use of constructive criticism
7. Loyalty, high morale
8. Punctuality and commitment

TRANSPARENCY DISCUSSION GUIDE

MAINTAINING EMPLOYMENT

I. Transparency--WHY WORKERS LOSE THEIR JOBS

   A. Discuss with students that human relations is the main reason why exmployees lose their jobs. Other reasons include a lack of technical knowledge and economic depression.

II. Transparency--ESSENTIAL PERSONALITY TRAITS FOR JOB SUCCESS/ HUMAN RELATIONS

   A. Have students give both positive and negative examples of each trait. Brainstorm for additional traits.

   B. Have students provide examples of situations in school where human relations skills can be used.

III. Transparency--UNDESIRABLE WORKER TRAITS

   A. Discuss each undesirable trait and have students act them out in class. Brainstorm for additional traits.

IV. Transparency--EMPLOYER EXPECTATIONS OF EMPLOYEE

   A. Discuss each expectation listed and brainstorm for additional expectations.

   B. Discuss expectations the employee would have of the employer.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

MAINTAINING EMPLOYMENT

MATCHING:

Column I

B 1. Morale

D 2. Tact

A 3. Compromise

C 4. Loyalty

E 5. Respect

Column II

A. Mutual agreement made by concessions on both sides.

B. State of mind which reflects an individual's attitudes.

C. Support for a cause.

D. Being able to express your ideas and opinions so they do not insult others.

E. Regard for other persons and their property.

SHORT ANSWER:

1. Define human relations. Knowing how to get along with others, knowing yourself, being able to work with people instead of against them, being able to react correctly in a given situation.

2. Name the 7 major parts of a business letter in order.

   a. Heading
   b. Address
   c. Salutation
   d. Body
   e. Complimentary Close
   f. Signature
   g. Signature identification and stenographic reference

3. Name 5 desirable worker traits.
    a. Dependability
    b. Initiative
    c. Enthusiasm
    d. Adaptability
    e. Self-control
4. Name 5 undesirable worker traits.
    a. Gossiping
    b. Complaining about everything
    c. Being consistently late
    d. Disrespect
    e. Loafing on the job
5. List 5 qualities or commandments of a good listener.
    a. Stop talking yourself
    b. Put the talker at ease
    c. Remove distractions
    d. Ask questions
    e. Go easy on argument and criticism

TRUE OR FALSE:

True 1. Non-verbal communication is just as important as verbal communication in human relations.

True 2. A proper handshake should be firm with two short up and down shakes.

False 3. The major reason people are fired from their jobs is because they lack the technical knowledge to succeed.

False 4. It is impossible to improve or change your human relations skills.

True 5. One of the major barriers to poor communication is the lack of proper listening skills.

UNIT B: Supervised Occupational Experience

UNIT B

UNIT B: SUPERVISED OCCUPATIONAL EXPERIENCE

Additional problem areas have not been included in this unit. The project advisory council and staff feel the unit has been adequately covered in Metropolitan Core I, II, and III as follows:

Core I - 1. Orientation to my SOE Program.
2. Planning my SOE Program.
3. Keeping Records on a SOE Program.

Core II - 4. Keeping SOEP Records Using the Floriculture Record Book.

Core III - 5. Evaluating Supervised Occupational Experience Programs and Analyzing Student Records.

UNIT C: Leadership in Horticulture/ Agriculture

UNIT C

UNIT C: LEADERSHIP IN HORTICULTURE/AGRICULTURE

Additional problem areas have not been included in this unit. The project advisory council and staff feel the unit has been adequately covered in Metropolitan Core I, II, and III as follows:

Core I -	1.	Understanding the National Junior Horticulture Association and FFA as a part of Vocational Horticulture/Agriculture.
	2.	Duties and Responsibilities of Youth Club Officers and Members.
	3.	Developing Basic Parliamentary Procedure Skills.
Core II -	4.	Participating in Individual and Group Activities in Youth Organizations.
	5.	Developing Leadership Skills.
	6.	Developing Basic Public Speaking Skills.
Core III -	7.	Utilizing Horticultural Organizations and Resources.

UNIT D: Horticultural/Agricultural Mechanics

PROBLEM AREA:

1. Operating, maintaining, and servicing lawn and garden equipment

UNIT D: HORTICULTURAL/AGRICULTURAL MECHANICS

PROBLEM AREA: OPERATING, MAINTAINING, AND SERVICING LAWN AND GARDEN EQUIPMENT

SUGGESTIONS TO THE TEACHER:

This problem area is designed to build on the problem area in Core I entitled "Using Selected Power Tools," and the problem area in Core II entitled "Servicing Small Gas Engines. The equipment included in this problem area are lawn mowers, rotary tillers, spreaders, edgers, sprayers, trimmers, sodcutters and aerifiers.

The recommended time for teaching this problem area is during the winter months when students could bring in lawn and garden equipment for maintenance and repair. If a laboratory phase is included in the instruction, 10 days or more could be devoted to this instruction.

To prepare for this problem area teachers should purchase copies of the Ortho Book entitled "How to Select, Use and Maintain Garden Equipment." Material included in this problem area is based on this book which is readily available at most garden centers or building supply dealers.

If students are to work on equipment the teacher will need to have access to the necessary hand and power tools and wll need a shop area where such work can be accomplished.

CREDIT SOURCES:

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The teacher's guide, information sheets, student worksheet and test questions were developed by Paul E. Hemp, Department of Vocational and Technical Education, University of Illinois and reviewed by Janet L. Henderson, Kallie S. Grobstein, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of this problem area were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Horticultural/agricultural mechanics

II. Problem area: Operating, maintaining, and servicing lawn and garden equipment.

III. Objectives: At the close of this problem area, students will be able to:

1. Name the different types of mowers, tillers, spreaders, sod-cutters, aerifiers, sprayers, edgers and trimmers and describe their major characteristics and functions.

2. Operate the equipment listed in Objective #1 in a safe and approved manner.

3. Maintain and service the above-named equipment.

4. Explain how each piece of equipment works.

5. Perform the following manipulative skills:

   a. Sharpen a mower blade
   b. Balance a mower blade
   c. Operate a rotary tiller
   d. Clean and service a lawn mower
   e. Fill and operate a sprayer

6. List the safety precautions to follow in the operation of the equipment listed in Objective 1.

IV. Suggested interest approaches:

1. Survey the class to find out the different kinds of lawn and garden equipment they have at home.

2. Ask students to report which pieces of equipment they have operated.

3. Flash pictures of lawn and garden equipment on a screen and ask students to identify it and tell how it is used.

4. Visit a garden center or hardware store to look at the different kinds and types of garden and lawn equipment.

5. Write the name of this problem area on the chalkboard and give the students a brief overview of what they will be studying during the next few days.

V. Anticipated problems and concerns of students:

1. What power equipment is needed to maintain a lawn and garden?

2. Should I buy or rent this equipment?

3. What factors should be considered in selecting a particular type or brand of equipment?

4. How do you operate these machines and tools in a safe and efficient manner?

5. How should this equipment be prepared for winter storage?

6. How should mower blades and other cutting parts be sharpened?

7. What special clothing should be worn when operating this equipment?

8. How should this equipment be lubricated or oiled?

9. What tools do I need to maintain and repair this equipment?

10. Can I earn a living repairing and/or renting lawn and garden equipment?

VI. Suggested learning activities and experiences:

1. Select or allow the students to select the equipment to be studied in this problem area. List the names of the equipment on the chalkboard so students are aware of what is to be included in this problem area.

2. Conduct an interest approach using one or more of the suggestions presented in Section IV.

3. Develop a list of student objectives based on the competencies which students need to develop. This list may be developed by each student depending on the kinds of equipment the students want to learn about and the level of competency they wish to develop.

4. Develop plans with the class for obtaining equipment for class use. Students can volunteer to bring in certain pieces of equipment or the instructor can borrow equipment from a local dealer.

5. Have students identify problems and concerns. These problems can be identified for each piece of equipment or problems which apply to all equipment can be used as a basis for instruction.

6. Use the transparencies included with this problem area and pictures in books or catalogs to identify equipment and to teach students the parts of each piece of equipment.

7. Arrange with a local dealer to have class assemble new equipment shipped to the store. This exercise provides practice in learning parts and in following directions.

8. Conduct a supervised study period to allow students time to study information sheets or other reference material and to search out answers to the problems identified earlier.

9. Conduct a class discussion to verify answers and to add additional information for each of the problems.

10. Use VAS Slidefilm 498 "Using Power Lawn Mowers Safely" to teach information related to this part of the problem area.

11. Assign a pair of students to a piece of equipment. Have them determine what maintenance should be carried out and have them do it.

12. Demonstrate skills such as sharpening a mower blade or operating a tiller and have students practice these skills in the laboratory or in the field. Use job sheets included with this problem area.

13. Obtain a variety of manufacturer's literature on lawn and garden equipment to review when discussing selecting and buying.

14. Have students practice sprayer operation by using water rather than pesticide as the spray material.

15. Require students to take and pass safety tests on mowers, edgers, rotary tillers and weed trimmers included in the Metropolitan Core I Problem Area "Using Selected Power Tools" before operating this equipment. Use lists of safety rules included in this same problem area as a source of information.

16. Promote the development of S.O.E. projects involving lawn and garden work. Students should consider doing custom work in the summer. The FFA may want to purchase equipment and rent it to students.

VII. Application procedures:

1. Students can apply what they learn in this problem area to maintenance jobs at home or to their S.O.E. programs.

2. Students can use skills learned in this problem area to start a small business.

3. Some students may want to pursue this area as a possible line of work to enter after high school.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate laboratory and field work done by student.

3. Grade worksheets completed by students.

IX. References and aids:

1. How to Select, Use, and Maintain Garden Equipment. Ortho Books, Chevron Chemical Company, 575 Market Street, San Francisco, CA 94105. (This 96 page book can be purchased at most bookstores or garden centers and is recommended as a primary source of information for this problem area).

2. Vocational Agriculture Service, College of Agriculture, University of Illinois, 1401 South Maryland Drive, Urbana, IL 61801.

    a. VAS Slidefilm 498 - Using Power Lawn Mowers Safely.

INFORMATION SHEET 1

TYPES OF LAWN MOWERS

The following types of mowers can be used on turf areas depending on the amount of grass to be cut, personal preference of the operator, and money available for investment in mowers:

PUSH REEL-MOWER--Provides inexpensive service but blades must be kept sharp and properly adjusted. Push reel mower is best for small lawns with short to medium length grass.

POWER REEL-MOWER--A powered version of the old style, reel-mower which makes a clean cut. The power reel-mower is safer than the rotary mower and it cuts rather than rips the grass blades. Reel mowers minimize the tendency of scalping or extremely close cutting on the high spots of an uneven lawn.

ROTARY MOWER--A power mower which operates at a tremendous speed to cut grass, weeds and other tough green material. Bags can usually be attached to collect the clippings.

ELECTRIC MOWER--A popular choice for small lawns. It is easy to start and operate.

SELF-PROPELLED MOWER--A luxury mower with both blades and wheels driven by a 4-6 horsepower engine. This mower usually has an electric start, transistorized electronic ignition, automatic choke and governor.

MOWER-MULCHER--A mower which has a special blade that cuts grass and leaves it in a fine powder to be deposited back on the lawn or blown into a bag. Many standard mowers can be converted to a mulcher by attaching a special blade.

AIR-CUSHION MOWER--A mower which has no wheels and rides on a cushion of air. It grinds the grass and deposits it back on the lawn. The air-cushion mower is useful on short grass and areas under low bushes or along borders.

RIDING MOWER--A large mower which enables the operator to ride rather than walk.

LAWN TRACTOR--A larger version of the riding mower which handles swaths up to 42 inches wide. The tractor can be used for other jobs with the necessary attachments.

GARDEN TRACTOR--A tractor powered with a 5-30 horsepower engine which can be utilized for a number of jobs including mowing, hauling, harrowing, plowing, and disking.

INFORMATION SHEET 2

OPERATION AND MAINTENANCE OF MOWERS

REEL MOWERS

Reel mowers usually have 5-8 spiral steel blades which turn on a reel and slice the grass with a scissorlike action when they make contact with the bed knife. A newspaper can be used to test the sharpness of a reel mower. The blade should touch the bed knife at all positions and if properly sharpened should easily cut a newspaper. The bed knife can be raised or lowered and cutting height can be adjusted by moving an adjustment knob near the end of the roller. Most reel mowers are best sharpened by sharpening specialists to ensure even and accurate work.

ROTARY MOWERS

Rotary mowers have a blade which must be kept sharp and in balance. A dull blade will beat the grass blades leaving jagged edges exposed to the elements. A blade which is out of balance will make the mower vibrate excessively. Refer to the job sheets on balancing a blade and sharpening a blade included with this problem area for instructions on this part of the mower.

Keep the mower clean. Use a clean, dry rag to wipe down the engine and the housing. The mower can be hosed off but only when it is cool and remember to keep water away from the spark plug. Clean the underside of the mower to get rid of grass clippings. If these clippings are not cleaned off after each use they will become dry and hard. To clean the underside of the mower, first pull the spark plug wire to prevent accidental starting and then tip the mower on its side. Use a hose with a power nozzle to remove clippings or matted material. Allow the mower to sun-dry.

In order to obtain high operating performance from the rotary mower, the engine must be properly maintained. Procedure for handling small engines are covered in the Metropolitan Core II problem area entitled "Servicing Small Gas Engines."

Rotary mowers can be dangerous to the operator and others if improperly maintained and operated. The following operating rules should be observed:

1. When using a mower, first check the area to be cut. Remove any debris such as sticks, rocks and metal objects.
2. Keep children away. All visitors should be kept a safe distance from the mowing area.
3. Wear suitable clothes. Do not wear loose clothing or jewelry that might be caught in moving parts. Wear work shoes.

4. Wear safety glasses.

5. Keep all guards in place and in good condition.

6. Keep hands and feet away from the cutting area.

7. Mow across slopes, never up and down.

8. Keep proper footing and balance while operating the mower.

9. Refuel only when the engine is stopped.

10. Children under the age of ten should never operate a power mower.

11. Stop the engine before making adjustments in cutting height.

12. Always set the four wheels at the same height.

13. Do not allow passengers, particularly children, to ride on a riding mower with the operator.

14. If the tractor has a key, always remove it when the machine is parked. Park tractors in neutral.

Most of these rules apply to all types of mowers; however, they are included in this section on rotary mowers because they are often the most commonly used and are likely to be the most dangerous.

INFORMATION SHEET 3

SHARPENING A ROTARY BLADE

1. Run the fuel tank nearly dry so that gasoline won't spill when you tip the mower.

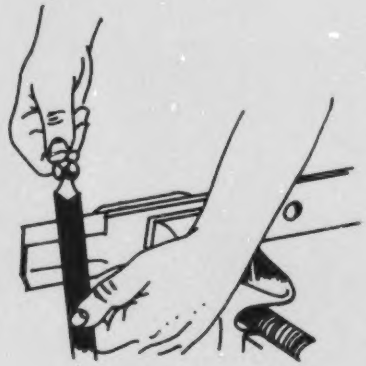
2. Remove the spark plug wire to guard against an accidental start.

3. Use an adjustable wrench to loosen the nut holding the blade. You may have to block the blade with a piece of scrap wood to keep it from turning with the wrench.

4. When removing the blade, be aware of shearing pins which may be a part of the blade assembly. These pins will come out when you remove the blade. Keep track of them so they can be replaced.

5. Place the blade in a vise with the cutting edge up.

6. Use a bastard file or grinder to sharpen the blade at a 30° angle. Sharpen from the outer edge toward the center. As you file across the blade use a down motion as shown below.



7. Don't try to file away deep nicks. Instead, round them out with a small round file.

8. After sharpening, check the blade for balance. See Job Sheet "Balancing a Blade" included with this problem area for suggested procedures.

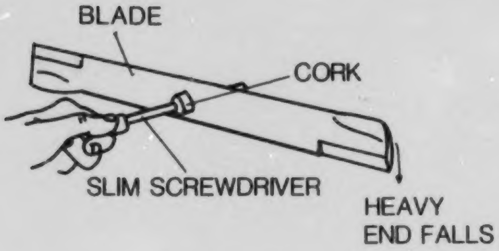
9. Replace blade after it has been properly balanced.

INFORMATION SHEET 4

BALANCING A ROTARY BLADE

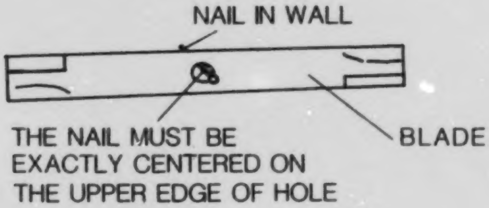
Cork Method

1. Drill a hole through the exact center of a cork and put it in the blade hole.
2. Put a screwdriver through the cork hole and hold it horizontally to see if the blade stays level or if one side is heavier and falls.


BLADE
CORK
SLIM SCREWDRIVER
HEAVY END FALLS

Nail in Wall Method

1. Drive a nail in the shop wall.
2. Center nail carefully in the hole to check blade balance.
3. If one side is heavier than the other, remove more metal from that side when sharpening. Remove this metal by grinding opposite blade side.

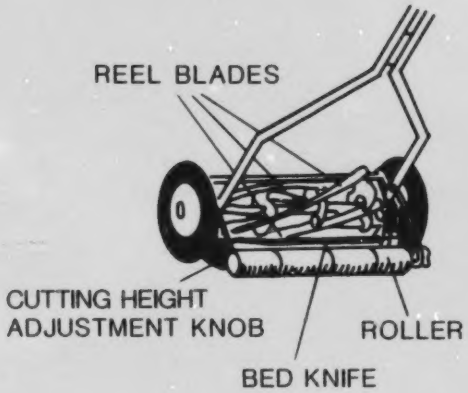

NAIL IN WALL
THE NAIL MUST BE EXACTLY CENTERED ON THE UPPER EDGE OF HOLE
BLADE

INFORMATION SHEET 5

ADJUSTING THE CUTTING HEIGHT OF A REEL MOWER

The adjustment procedures vary for different makes of reel-type mowers; however, the following procedures usually apply:

1. Place mower on a perfectly flat surface such as the garage floor or sidewalk.
2. Disconnect the spark plug wire from the spark plug and place it in a position where it cannot make contact with the plug and cause accidental starting.
3. Adjust the bed knife to the proper height by manipulating the height adjusting set screws or by adjusting the wheel height.
4. Rotate the reel blade to see if clearance between reel blades and the bed knife is uniform along the entire length of each blade. If it is not, and if proper clearance cannot be achieved, the blades may have to be ground.



INFORMATION SHEET 6

ROTARY TILLERS

Description and Use

Rotary tillers are used to cultivate, to turn under a green manure crop or to prepare a seedbed. Homeowners who have large gardens or flower beds can justify the purchase of this piece of power equipment. For small areas which require cultivation only, a smaller electric cultivator can be used.

The two basic types of rotary tillers are the front-tine tiller and the rear-tine tiller. The front-tine tillers are cheaper and more widely used than the rear-tine equipment. They work best in areas which have been tilled before. The rear-tine tillers are heavier and better for rough, compacted areas. Due to their weight, they are easier to operate and control.

Selection

Before buying a tiller, consider whether your garden is large enough to justify the cost of owning and operating such equipment. An electric cultivator may be adequate to cultivate a small garden or larger equipment could be rented or purchased in a partnership arrangement. Attachments such as a snowblower or dozer blade can be purchased with some models.

Operation

Tillers should not be used on soil that is too wet or too dry. If the soil is too wet, the tiller will form mud balls which later become clods. Soils that are too dry and hard are difficult to till and may need to be watered 3 or 4 days prior to tilling. High weeds or other vegetative growth should be cut before tilling to avoid tangling around the tiller tines.

Tillers are difficult to handle and control. The operator should keep his or her feet away from the tines and maintain complete control of the machine. To maintain control the operator should weigh down the depth bar by pushing down on the handlebars. Even so, tillers will buck and gyrate and soon exhaust the operator. Stay relaxed and allow the tiller to jump ahead when it hits a hard object or area.

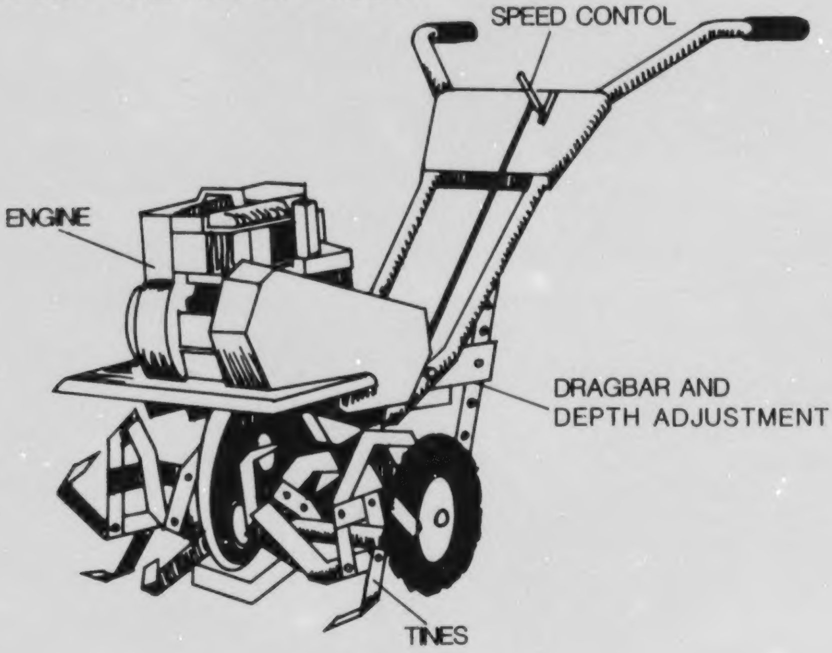
Gyrating can be reduced by tilling only 2-3 inches on the first pass. Make two passes at right angles to each other when tilling new ground.

Maintenance

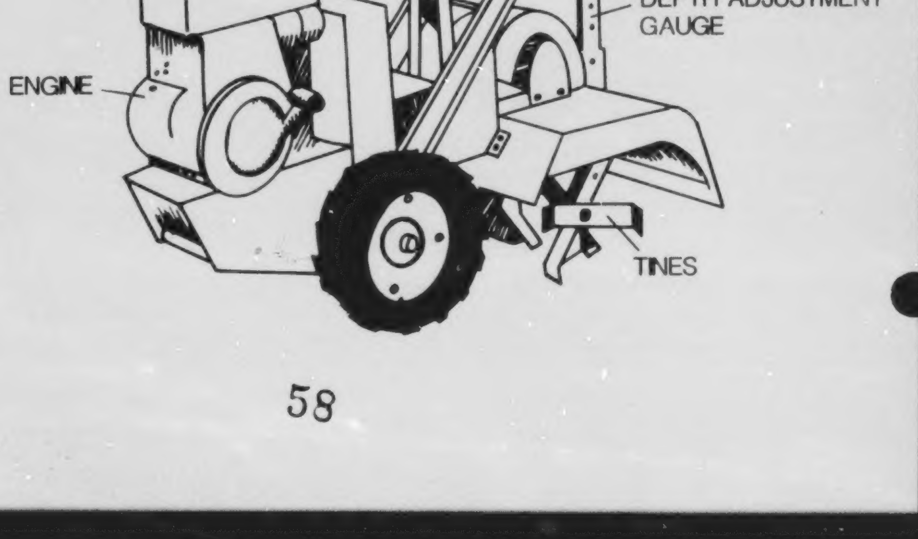
Clean dirt and debris from the tines after use. Wipe the engine with a dry rag and blow away dust or other material.

The tines should be sharpened periodically as explained in the operator's manual. Use a medium-size bastard mill file to sharpen each blade at a 70°-80° angle. The tines should be removed from the tiller so that they can be secured in a vise.

FRONT-TINE ROTARY TILLER


SPEED CONTOL
ENGINE
DRAGBAR AND
DEPTH ADJUSTMENT
TINES

REAR-TINE ROTARY TILLER


SPEED CONTROLS
GEAR LEVERS
CLUTCH LEVER
GAS TANK
DEPTH ADJUSTMENT
GAUGE
ENGINE
TINES

INFORMATION SHEET 7

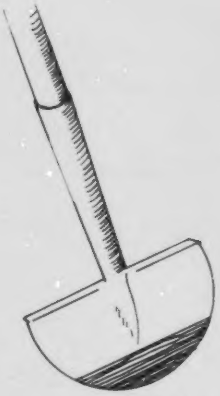
LAWN AND GARDEN EDGERS

Edging means cutting vertically to make garden beds and the lawn next to walks neat. Three types of edgers are described in this information sheet.

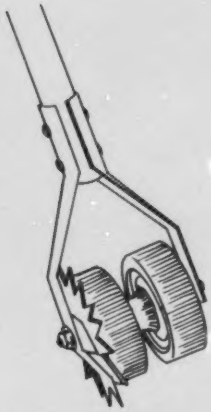
SEMICIRCULAR TURF EDGER--A hand tool that can be used to cut through soil as well as grass. It takes soil away so it should not be used more than once or twice a year. The semicircular turf edger looks like a hoe that has been straightened out and trimmed to a half-moon shape. See the transparency sheet included with this problem area for a drawing of this type of edger.

ROTARY EDGER--A hand tool used to edge a lawn next to a walk or drive. The wheels roll along the surface next to the lawn and the rolling action drives the multitoothed rotary blades. The rotary edger can be pulled back and forth in a repetitive motion depending on the amount of sod to be cut away.

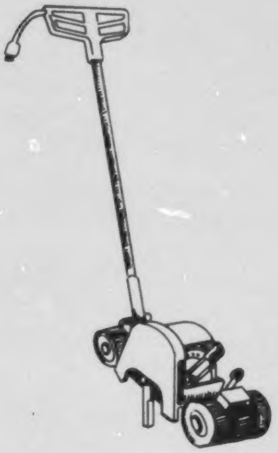
ELECTRIC EDGER--A power tool which includes an edging blade that ranges from 6-8 inches in length and leaves a trench 0-2 inches deep. A control is located on the handle for safe operation. The electric edger can usually be adjusted for depth and some models are constructed as combination edger and trimmer. Safety goggles should be worn for safe operation.



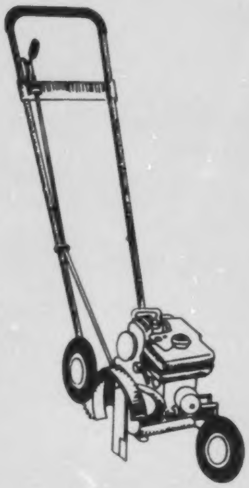
SEMICIRCULAR TURF EDGER



ROTARY EDGER



ELECTRIC EDGER



GASOLINE POWERED EDGER

INFORMATION SHEET 8

NYLON STRING TRIMMERS

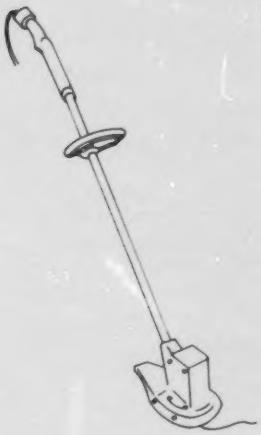
One of the most useful and time-saving lawn tools is the nylon string trimmer. It cuts by the rapid whirling of a nylon string that cuts grass or small weeds. The trimmer can be used next to walls, along fence lines and walks or as an edger along walks or garden beds. Three types of nylon string trimmers described in this information sheet are the battery-operated, electric, and gasoline-powered. Sketches showing these three types and the major parts have been included on a transparency master included with this problem area.

BATTERY OPERATED TRIMMER--This tool can be used for small jobs which require 30-40 minutes of cutting. On most models, the batteries can be recharged by plugging them into a 110 volt outlet overnight.

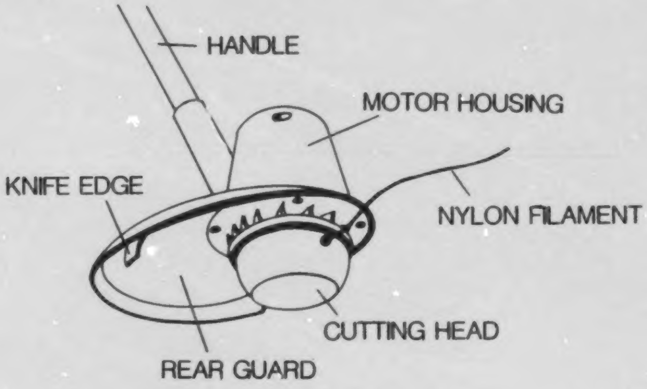
ELECTRIC TRIMMER--This tool is recommended for the average-sized lawn. It is lightweight and quiet. The nylon line feed may be either automatic or semiautomatic. A heavy duty electric cord 50-100 feet long and suitable for outdoor use should be purchased or made available.

GASOLINE-POWERED TRIMMER--This trimmer is a heavy duty tool equipped with a 14-30 cubic centimeter engine. It should be considered by persons who have a lot of trimming to do or trimming which involves large weeds or other plant material.

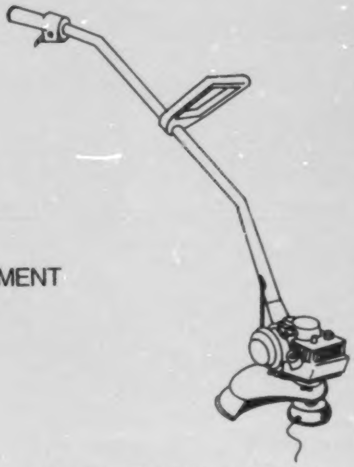
MAINTENANCE--The nylon string trimmer comes with a spool containing up to 50 feet of nylon. The nylon string or cord spins rapidly to cut grass or other plants. In this process, the cord is worn back with use and more cord is fed out either automatically or by other means. A knife edge in the rear guard trims off the frayed end and prevents too much cord from being used. When operating a trimmer, sturdy shoes should be worn and safety goggles are recommended.



ELECTRIC TRIMMER



TRIMMER PARTS



GASOLINE-POWERED TRIMMER

INFORMATION SHEET 9

BROADCAST AND DROP SPREADERS

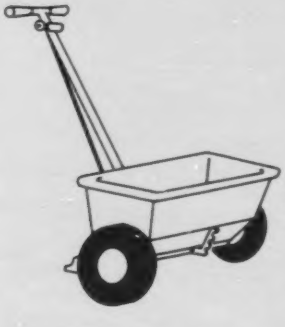
Spreaders can be used to apply fertilizer or to spread seed, pesticide or mulch. Two types of spreaders are described in this information sheet--broadcast and drop spreaders. In addition, hand-held and wheeled spreaders are sometimes used.

BROADCAST SPREADER--This spreader drops fertilizer or other material from a hopper to a pan which rotates at a high rate of speed. Materials are distributed over a wide swath with a heavier application in the middle than at the edges. For this reason, overlap is necessary to obtain proper coverage. Broadcast spreaders work better on rough areas and are quicker than drop spreaders.

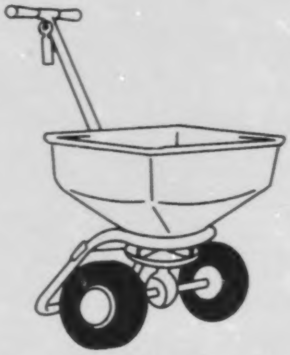
DROP SPREADER--This spreader deposits an even layer of material on the area covered. Materials from the bin are fed out through holes in the hopper as the wheels turn an agitator linked to the axle. Overlap is not necessary since the drop spreader gives an even distribution of materials. The disadvantages of this type of spreader are that it is relatively slow and does not work well on rough areas. For lawns, drop spreaders are usually recommended due to the precise coverage which can be obtained.

OPERATION AND MAINTENANCE--Most spreaders have a calibrated metering device which enables the operators to control the amount of material distributed on the lawn or garden area. By referring to the directions provided with the material to be spread, the operator can adjust the metering device for the desired coverage. To check for even flow on the drop spreader, operate the equipment across a concrete floor or walk way to see if all openings are clear. Material dropped can be swept together and saved.

When operating a drop spreader, overlap the wheel tracks to obtain even and full coverage. Do not open the gate (openings at bottom of bin) until you have started the spreader in motion. After use, clean the spreader with a hose and allow it to dry. Do not store a spreader with fertilizer left in the bin because moisture will be absorbed and caking may result. Moving parts should be oiled periodically



DROP SPREADER



BROADCAST SPREADER

INFORMATION SHEET 10

TYPES OF SPRAYERS

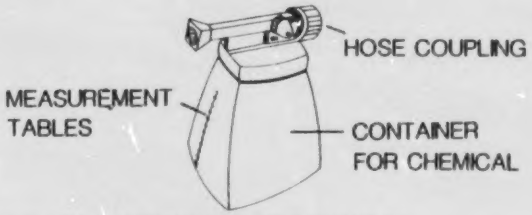
Sprayers are used to apply liquid pesticides. Common types of sprayers used in the control of lawn and garden pests and described in this information sheet are hose-end sprayers, compression sprayers, pump sprayers, and slide-type sprayers. Transparency masters illustrating these sprayer types are included with this problem area.

HOSE-END SPRAYER--These sprayers have a plastic or glass container with a cap that screws on to the end of a hose. The container or jar holds the spray concentrate which is diluted and mixed with water when the hose is turned on.

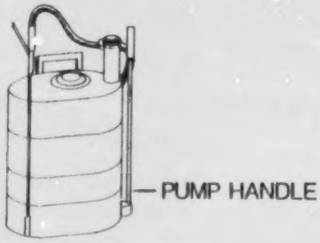
COMPRESSION SPRAYER--Compression sprayers are probably the most widely used type of small hand sprayers. They have a plastic or metal tank which holds from 2-4 gallons of spray material. A hand pump is used to create pressure inside the tank and a long flexible wand with an adjustable nozzle is used to apply the chemical or other liquid material.

PUMP SPRAYER--The pump sprayer is recommended for large jobs that require a great deal of walking. This sprayer is steel or plastic and may hold as much as 5 gallons of mix. It is designed to be carried on the back of the operator who is required to work a pump handle with one hand and direct the spray with the other hand.

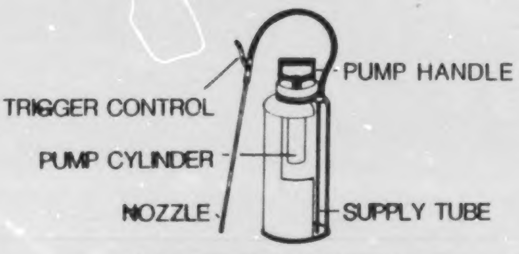
SLIDE-TYPE SPRAYER--This sprayer is a "trombone" type sprayer which operates when a pump built into the handle is moved back and forth to create a constant stream of spray material. It is useful in spraying trees or other spraying jobs where the liquid needs to be thrown a considerable distance. One end of the hose is inserted into a container of spray material and the other end has the trombone-type handle which creates a pumping action.



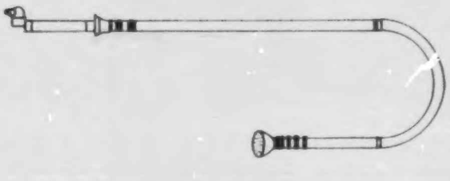
HOSE-END SPRAYER



PUMP SPRAYER



COMPRESSION SPRAYER



SLIDE-TYPE SPRAYER

INFORMATION SHEET 11

SELECTION, OPERATION, AND MAINTENANCE OF SPRAYERS

SELECTION--The type of sprayer you buy depends on how you plan to use it. In some cases, you may want to own all 3 types. The hose-end sprayer is cheap and easy to use. It requires no pumping and puts out a large volume of spray quickly. Its range is limited but the hose-end sprayer is especially useful on lawns and large masses of shrubs and bushes. The compression sprayer can be taken anywhere and used where a precise spraying job needs to be done. One disadvantage of the compression sprayer is that the nozzle or spraying wand may get clogged. The slide-type sprayer produces the farthest-reaching stream but it requires constant pumping.

Sprayers are usually made of plastic or galvanized steel. Fittings such as nozzles are commonly made of brass. The material used to construct sprayers should be resistant to corrosion and rust.

The sprayer tank should have a wide base to prevent tipping. The tank mouth should be wide to allow for easy filling and rinsing.

Two commonly used spray nozzles are the hollow cone and the flat fan nozzle. The flat fan nozzle has a wide spray pattern useful on lawns. The hollow cone nozzle has a circular spray pattern which is best for spraying shrubs.

OPERATION--Hose-end sprayers usually have adjustable nozzles ranging from a fine mist to a straight stream of spray material. The mixing ratio of water to chemical may be pre-set on some hose-end sprayers. Others have a fixed mixing ratio built into the nozzle. The operator should follow the mixing directions on the chemical container.

Mixing ratio to determine proper mixing procedures.

Example

1. Label on chemical calls for one tablespoon of chemical per gallon of water. Fixed mixing ratio of sprayer is 14:1.

2. Measure 14 tablespoons of chemical and put it into the sprayer jar. Add enough water to raise liquid in the jar to the 1 gallon mark.

After spraying, leftover chemical in the spraying jar should be removed and discarded in a safe manner. Rinse the sprayer and allow it to dry.

The compression sprayer can be operated effectively by using the following procedures:

1. Mix the chemical and water to the recommended proportions shown on the container label. Chemical and water can be mixed directly in the tank or in a separate container and transferred to the sprayer.

2. Insert pump assembly and tighten. Pump up until pressure makes pumping very difficult.

3. Start the spraying process making any necessary adjustments in the spray nozzle.

4. As pressure is reduced, pump additional pressure to maintain the necessary spray pattern.

5. When spraying is complete, empty and rinse tank and clean spray wand and nozzle. Unscrew nozzle to see if it is clogged. Run water through the hose and nozzle and rinse tank three times.

The gasket at the bottom of the cylinder and the plunger cup will need occasional oiling.

Pump sprayers and slide-type sprayers can be operated and maintained by using most of the procedures outlined above for compression sprayers. All sprayers should be cleaned after use and kept dry while in storage. Corrosion and rust will affect sprayer operation and eventually limit the life of the sprayer.

INFORMATION SHEET 12

SODCUTTERS AND AERIFIERS

SODCUTTER--This piece of equipment is used to cut sod to definite and regular thickness and width, insuring that it can be evenly relaid. It consists of a power unit with a blade set to cut under the sod and along the edges. As the machine cuts the sod loose, the sod is usually rolled by workers to facilitate handling. The thickness of the sod is determined by the angle of the cutting blade which can be adjusted as needed.

AERIFIER--This machine is used to aerify tight compacted soil by removing cores of soil or by inserting tines into the soil. The former method is preferred since this type of aerifier actually pulls out cores of soil leaving space for air and water to get into the soil. The prong or tine type of aerifier creates small holes by forcing tines into the soil.

Aerifiers are needed to increase the air supply to plant roots in soils that have been compacted over a period of time.

STUDENT WORKSHEET 1

TROUBLE SHOOTING SPRAYERS

Some common sprayer problems are listed below. For each of these problems, list the cause and the suggested remedy.

PROBLEM: Air hisses out from the top of the tank when pumped up. Tank does not hold pressure.

CAUSE: ____

____

REMEDY: ____

____

PROBLEM: Sprayer does not pump up. When pumping, operator feels no resistance.

CAUSE: ____

____

REMEDY: ____

____

____

PROBLEM: Sprayer does not spray when pumped up.

CAUSE: ____

____

REMEDY: ____

____

____

PROBLEM: Sprayer does not shut off when handle is released.

CAUSE: ____

____

REMEDY: ____

____

PROBLEM: Spray pattern is uneven.

CAUSE: ____________________

____

REMEDY: ____________________

____

BEST COPY AVAILABLE

TEACHER'S KEY

STUDENT WORKSHEET 1

TROUBLE SHOOTING SPRAYERS

Some common sprayer problems are listed below. For each of these problems, list the cause and the suggested remedy.

PROBLEM: Air hisses out from the top of the tank when pumped up. Tank does not hold pressure.

CAUSE: The cylinder seal is dirty or worn

REMEDY: Clean cylinder seal and reseal or replace seal.

PROBLEM: Sprayer does not pump up. When pumping, operator feels no resistance.

CAUSE: Plunger cup is not in contact with cylinder walls.

REMEDY: Lubricate cup with small amount of oil. Check cup at bottom of cylinder. Rub oil into cup if it is leather If it is rubber and worn, replace.

PROBLEM: Sprayer does not spray when pumped up.

CAUSE: Spray wand is clogged up.

REMEDY: Use toothpick or copper wire to clean. Clean holes in ends of wand and also the parts at the spray control valve.

PROBLEM: Sprayer does not shut off when handle is released.

CAUSE: Wand is loose or "on" latch is engaged.

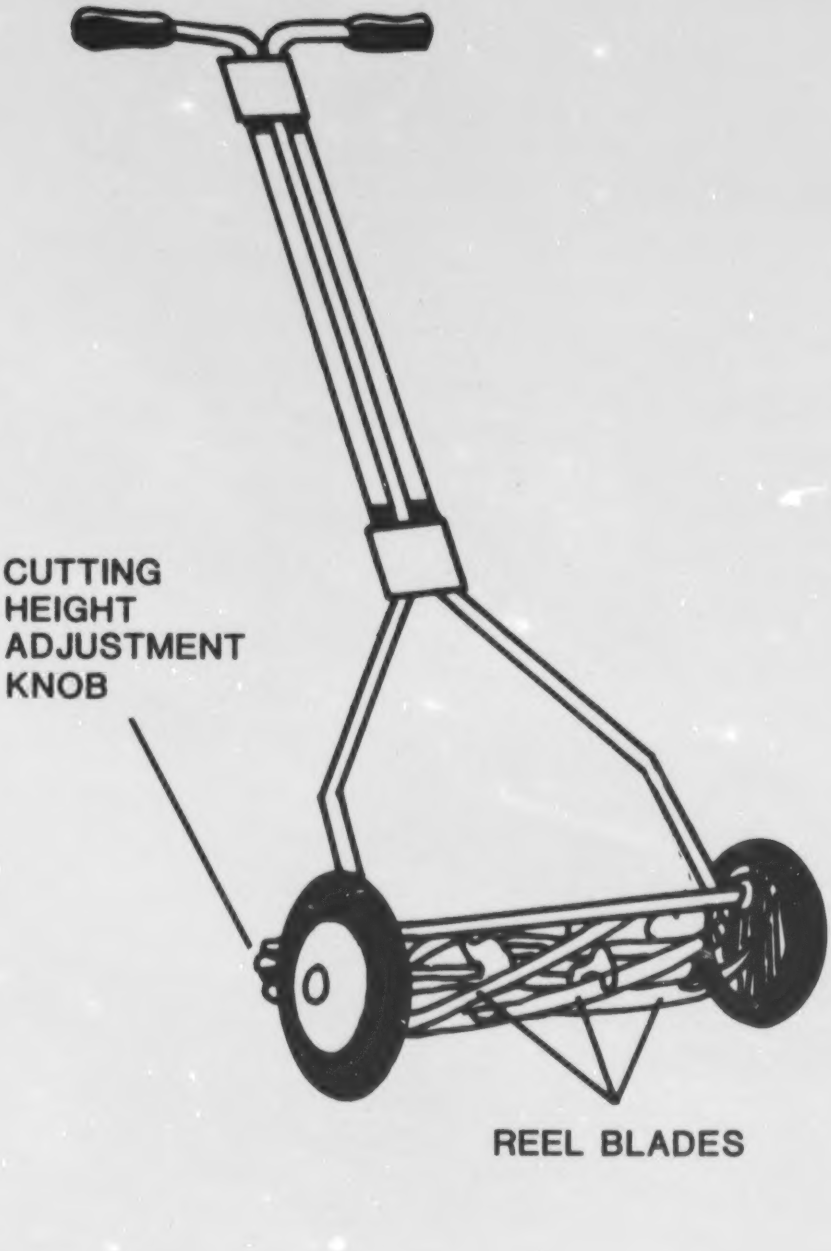
REMEDY: Release "on" latch. Tighten wand at end of spray control valve.

PROBLEM: Spray pattern is uneven.

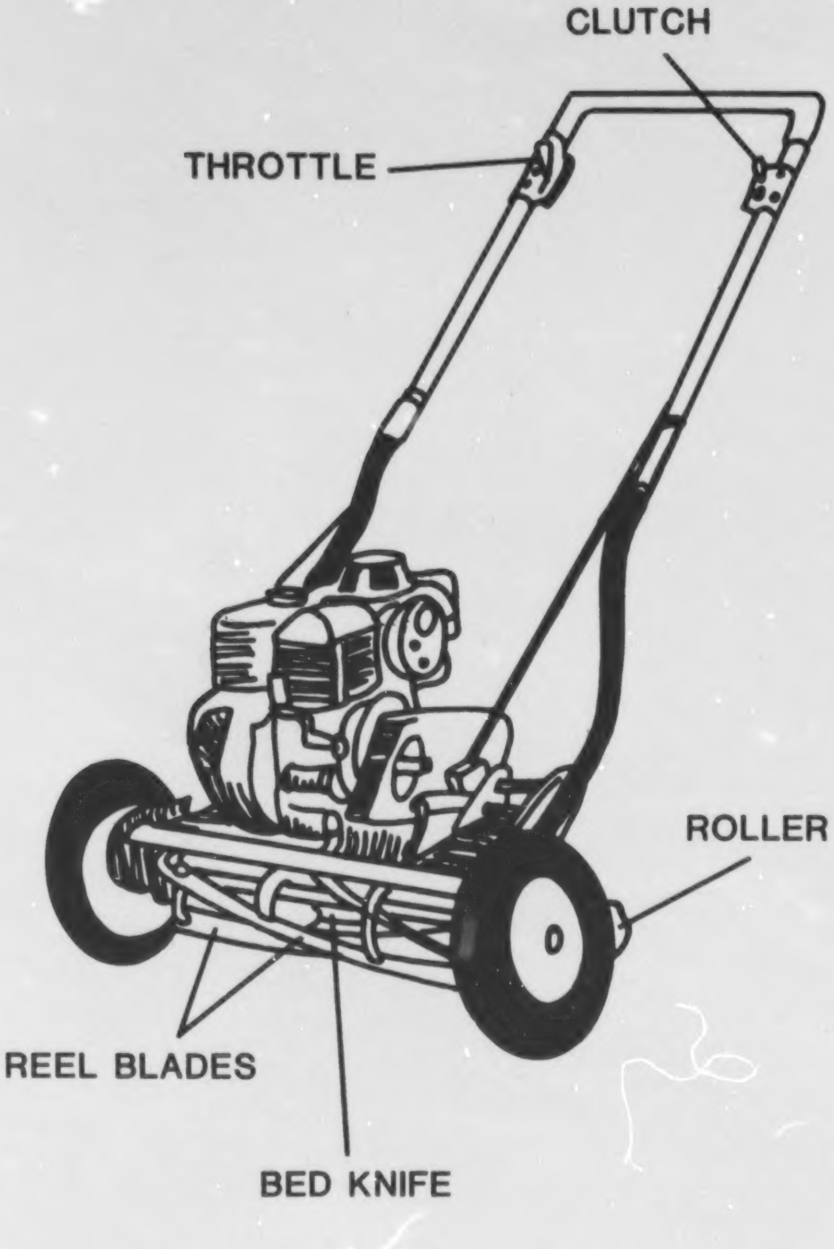
CAUSE: Nozzle is dirty or plugged.

REMEDY: Clean nozzle. Replace nozzle if necessary.

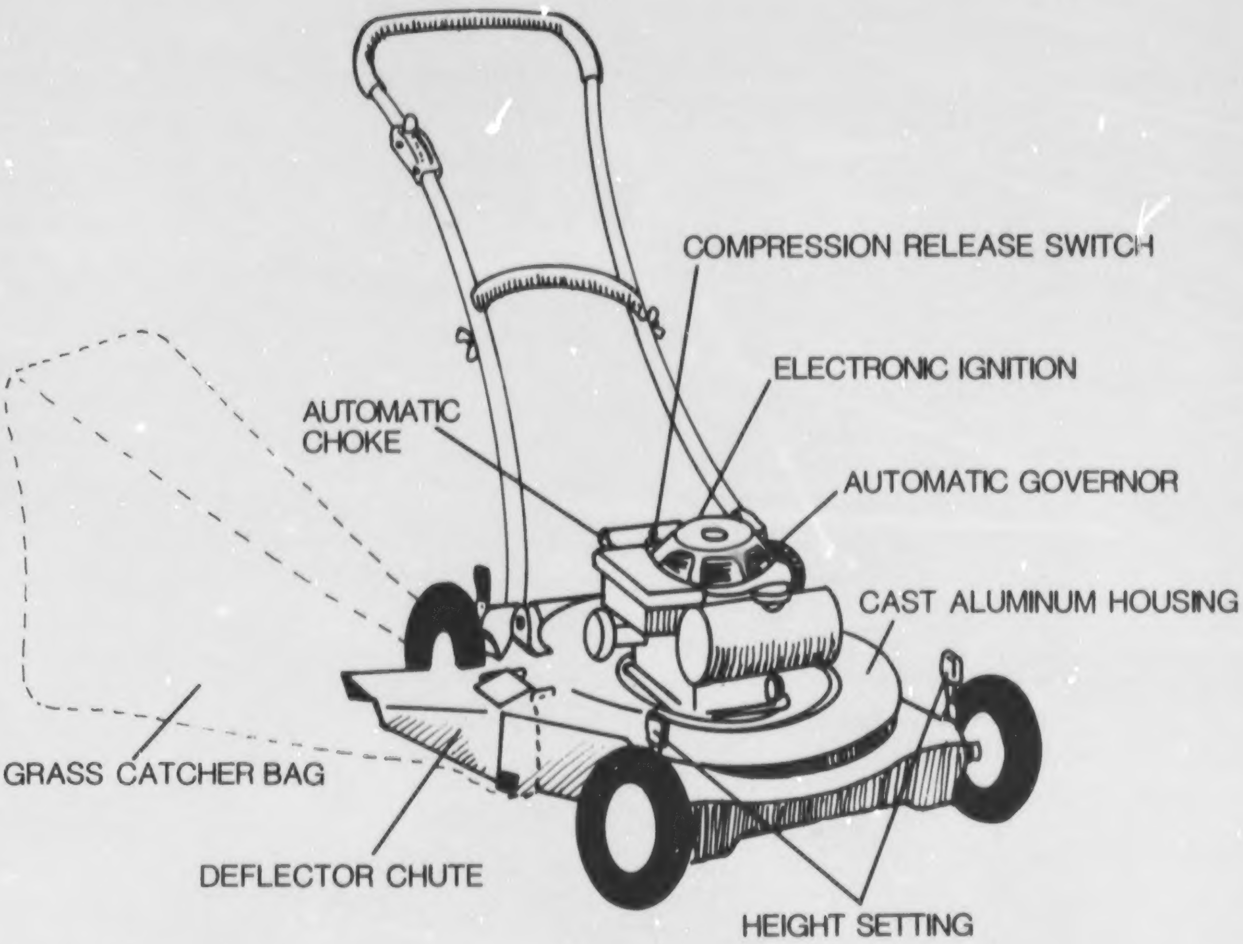
PUSH REEL MOWER


CUTTING HEIGHT ADJUSTMENT KNOB
REEL BLADES

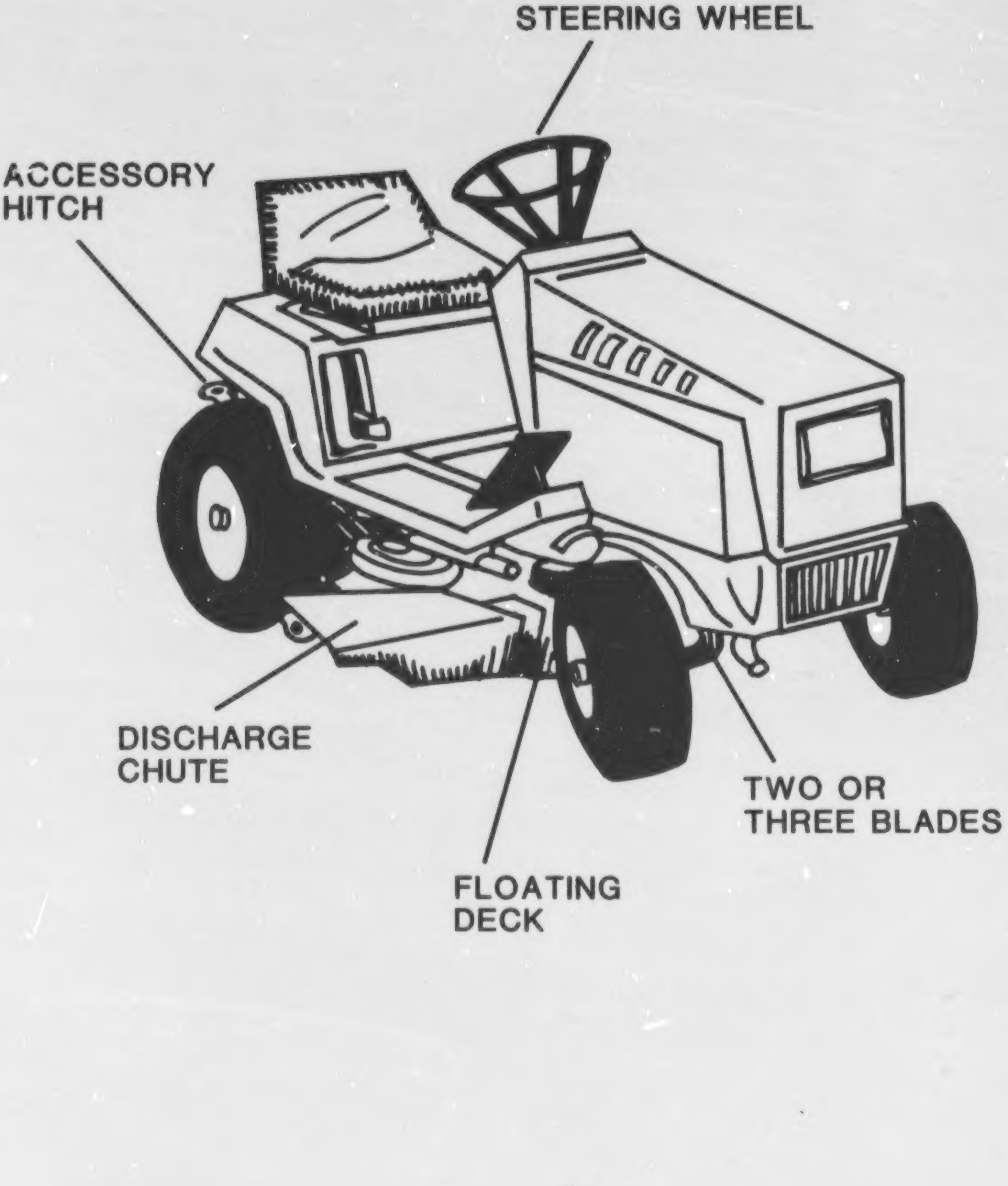
POWER REEL MOWER


CLUTCH
THROTTLE
ROLLER
REEL BLADES
BED KNIFE

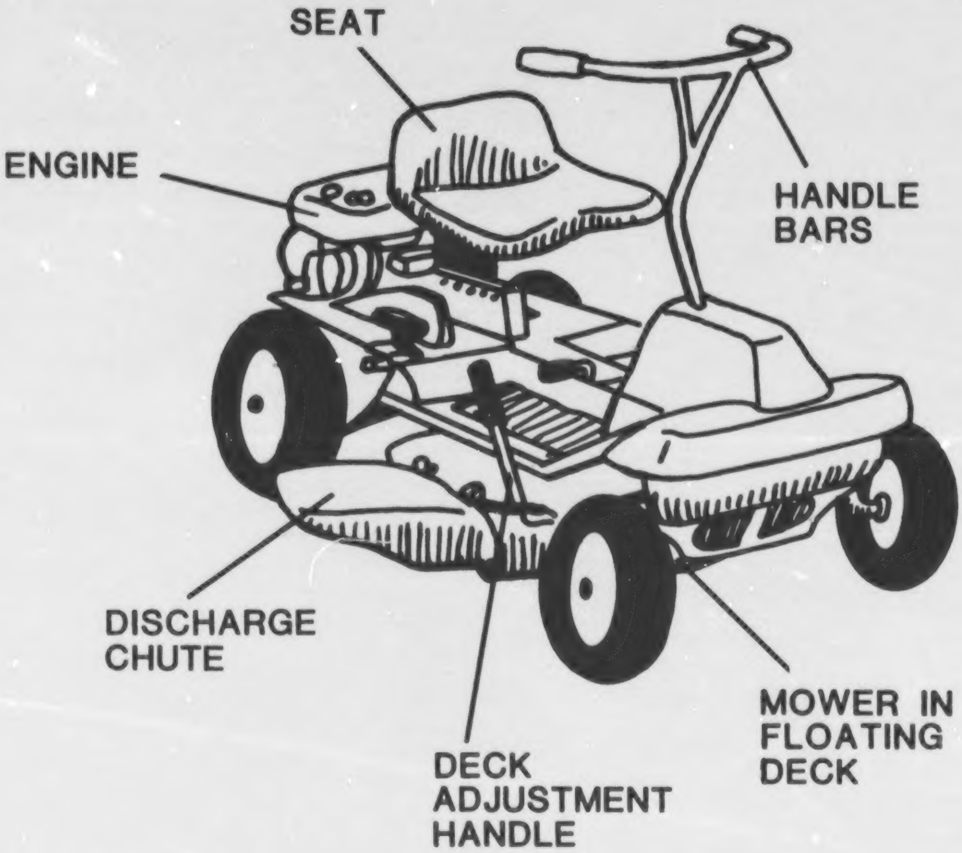
GASOLINE-POWERED ROTARY MOWER


COMPRESSION RELEASE SWITCH
ELECTRONIC IGNITION
AUTOMATIC CHOKE
AUTOMATIC GOVERNOR
CAST ALUMINUM HOUSING
GRASS CATCHER BAG
DEFLECTOR CHUTE
HEIGHT SETTING

LAWN TRACTOR


STEERING WHEEL
ACCESSORY HITCH
DISCHARGE CHUTE
TWO OR THREE BLADES
FLOATING DECK

RIDING MOWER


SEAT
ENGINE
HANDLE BARS
DISCHARGE CHUTE
MOWER IN FLOATING DECK
DECK ADJUSTMENT HANDLE

TRANSPARENCY DISCUSSION GUIDE

OPERATING, MAINTAINING, AND SERVICING LAWN AND GARDEN EQUIPMENT

I. Transparency--PUSH REEL MOWER

A. Provides inexpensive service but blades must be kept sharp and properly adjusted. Push reel mower is best for small lawns with short to medium length grass.

II. Transparency--POWER REEL MOWER

A. A powered version of the old style, reel-mower which makes a clean cut. The power reel-mower is safer than the rotary mower and it cuts rather than rips the grass blades. Reel mowers minimize the tendency of scalping or extremely close cutting on the high spots of an uneven lawn.

III. Transparency--ROTARY MOWER

A. A power mower which operates at a tremendous speed to cut grass, weeds and other tough green material. Bags can usually be attached to collect the clippings.

IV. Transparency--LAWN TRACTOR

A. A larger version of the riding mower which handles swaths up to 42 inches wide. The tractor can be used for other jobs with the necessary attachments.

V. Transparency--RIDING MOWER

A. A large mower which enables the operator to ride rather than walk.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

OPERATING, MAINTAINING, AND SERVICING LAWN AND GARDEN EQUIPMENT

TRUE OR FALSE:

False 1. One should mow up and down slopes rather than across them.

True 2. Children under the age of ten should not operate a power mower.

False 3. Fuel can be added to the tank while the engine is running but the mower is stopped.

True 4. Reel mowers can usually be sharpened best by a professional or sharpening expert.

False 5. A mower blade should be sharpened down so that all deep nicks are removed.

False 6. A broadcast spreader gives a more even distribution of fertilizer than a drop spreader.

True 7. Tall weeds should be cut before tilling new ground.

True 8. With a rear-tine tiller the operator can walk beside it to guide the machine.

True 9. Push reel-mowers operate well only on level ground with short-to medium-length grass.

False 10. Rotary mowers are safer to operate than reel-type mowers.

True 11. An air cushion mower has no wheels.

True 12. Eye goggles or protectors should be worn when operating an electric edger.

True 13. Backpack pump sprayers have a pump handle which must be operated continuously while spraying.

False 14. A hand-carried, compression sprayer is the best sprayer to use on tall trees.

True 15. When performing maintenance work on a mower or tiller, the spark plug wire should be removed from the plug.

SENTENCE COMPLETION:

1. Two basic types of rotary tillers are front-tine tillers and rear-tine tillers.

2. A sprayer which requires no pumping is the hose-end sprayer.

3. Most nozzles are made of brass or stainless steel.

4. The hand sprayer which shoots spray the greatest distance is the slide-type sprayer.

5. Two common types of sprayer nozzles are flat-fan and hollow-cone.

6. Trimmers cut grass horizontally and edgers cut grass or sod vertically.

7. On a reel mower the blade should make contact with the bed knife in order to cut.

8. The clutch should be in neutral when the machine is being started.

9. Front-tine tillers do not have power wheels.

10. After sharpening, a rotary mower blade should be balanced.

11. The reel mower minimizes the tendency of scalping on an even lawn.

12. A machine used to increase the air supply in a compacted soil is called a(n) aerifier.

SHORT ANSWER:

1. What are three advantages of a reel-type mower?

   a. Cuts the grass rather than ripping or beating it.
   b. Safer to operate than a rotary mower.
   c. Will not scalp the grass on an uneven lawn.

2. Name three suggestions to follow in dressing properly while operating power equipment.

   a. Wear safety goggles.
   b. Wear sturdy shoes.
   c. Avoid loose clothing that might become entangled in moving parts.

3. If you have sprayed with a chemical and have about a quart of spray material left over, which of the following procedures would you choose? ____c____.

   a. Keep spraying until material is gone.
   b. Leave material in sprayer so it can be used next time.
   c. Discard leftover material according to directions on the pesticide label.

4. What is preventative maintenance?

   Preventative maintenance involves (1) periodic inspection to discover situations which may lead to breakdown and (2) upkeep to minimize wear and to remedy potential trouble.

UNIT E: Plant Propagation

PROBLEM AREA:

1. Propagating by tissue culture

UNIT E: PLANT PROPAGATION

PROBLEM AREA: PROPAGATING BY TISSUE CULTURE

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended time for teaching this problem area is upon completion of an introductory problem area on plant propagation principles and techniques.

The estimated instructional time for this problem area is 3 to 4 days depending on how far the teacher wishes to go in discussing specialized plant propagation techniques. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheet, student worksheet, transparency discussion guide, and test questions were developed by Janet L. Henderson, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Kallie S. Grobstein, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois, and Ken McPheeters, Ornamental Horticulture Specialist, Vocational Agriculture Service, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Plant propagation

II. Problem area: Propagating by tissue culture

III. Objectives: At the close of this problem area, students will be able to:

1. Define terms related to tissue culture.
2. Identify materials and pieces of equipment related to tissue culture.
3. List the steps in propagating plants by tissue culture.

IV. Suggested interest approaches:

1. Review general plant propagation techniques covered in Core II and III, Unit E - Plant Propagation.
2. Discuss with students examples of cloning they may have read about in the newspaper or seen on television. Ask the following lead questions:
   a. What is a clone?
   b. How are clones produced?
   c. How could clones be used in the horticulture industry?

V. Anticipated problems and concerns of students:

1. What is tissue culture?
2. How are plants propagated by tissue culture?
3. What plants can be propagated by tissue culture?
4. What equipment and materials are needed for tissue culture?
5. What stages are necessary for propagating plants by tissue culture?
6. What are the advantages and disadvantages of propagating plants by tissue culture?

VI. Suggested learning activities and experiences:

1. Show Introduction to Plant Propagation By Tissue Culture - VAS Slidefilm F600-1.
2. Tour a research or commercial greenhouse that propagates plants by tissue culture.

3. Discuss the advantages and disadvantages of plant propagation by tissue culture. Use a resource person if available. Have students consider some of the possible outcomes of plant propagation by tissue culture.

4. Compare and contrast the different methods of plant propagation including tissue culture. Lead a class discussion or assign individual student work. Consider the plant part used, time required for rooting, examples of plants propagated by the method.

5. Have students review current horticultural trade magazines/journals for articles and advertisements on tissue culture. Allow students to share their findings with the class. Posters could be made using the collected information.

6. Have students complete Student Worksheet 1 after reviewing Information Sheet 1 and viewing VAS Slidefilm Introduction to Plant Propagation by Tissue Culture.

VII. Application procedures:

1. The purpose of this problem area is to introduce students to plant propagation by tissue culture. Hands on experience with this method of plant propagation is unlikely at the secondary level.

2. A general understanding of plant propagation by tissue culture will be valuable for students who plan to study a more advanced horticulture curriculum.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions included in this problem area.

2. Evaluate the student worksheet.

IX. References and aids:

1. Vocational Agriculture Service, College of Agriculture, University of Illinois, 1401 S. Maryland Drive, Urbana, IL 61801.

    a. VAS Slidefilm F600-1: Introduction to Plant Propagation by Tissue Culture.

2. Plant Propagation: Principles and Practices (3rd Edition), by H. T. Hartmann and D. E. Kester. Prentice-Hall, Inc., Englewood Cliffs, NJ, 1976.

INFORMATION SHEET 1

PLANT PROPAGATION BY TISSUE CULTURE

CLONES are groups of genetically uniform plant material that are derived from a single parent plant and are propagated by vegetative means, such as cutting, division, and grafts. One of the newest propagation techniques is the cloning of plants by using TISSUE CULTURE.

Tissue culture is the maintenance and growth of plant cells under precisely-controlled artificial conditions within a laboratory environment. The propagation procedures require aseptic conditions and a special culture medium.

Tissue culture has some inherent advantages and disadvantages as a plant propagation technique:

Advantages--

1. the creation of prototype plants that have desirable characteristics, such as disease resistance, winter hardiness, or increased flower production.
2. the production of a large number of plants within a relatively small space and short time period; a single parent plant can produce thousands of new plants indentical to itself.

Disadvantages--

1. specialized equipment and expertise are necessary to successfully propagate plants by tissue culture.
2. unless sterile conditions are maintained, tissue cultures can easily become contaminated.
3. the creation of a large number of plants of the same genotype that may contain hidden susceptibility to harmful microorganisms; if infested, the entire crop or plant population could be destroyed.

There are three stages in propagating plants by tissue culture.

Stage I

1. The first step in tissue culture is to obtain a suitable EXPLANT. An explant is a small piece of tissue which is removed from the parent plant for purposes of culture. Tissue culture can be started from different parts of an individual plant as long as the cells are capable of dividing.
2. Surface contaminants (bacteria and fungi) must be removed prior to culturing. The explant is disinfested by washing in running tap water for up to 2 hours and by immersing in a dilute bleach solution.

3. All equipment, instruments, and containers must be sterilized. An AUTOCLAVE is used to sterilize the supplies used in tissue culture.

4. A special culture medium is prepared. The nutrients needed in culture mediums vary with the kinds of plants being propagated. The following substances are required in varying amounts for culture mediums:

   a. inorganic elements - Nitrogen (N), Potassium (K), Phosphorus (P), Calcium (Ca), Magnesium (Mg)

   b. sugar - sucrose is commonly used as an energy source

   c. vitamins

   d. growth regulators

   e. organic substances - coconut milk promotes growth and differentiation in a wide variety of plants

5. A meter is used to measure the pH of the culture medium; a range of 5.5 to 6.0 is desirable.

6. AGAR is added to help solidify the culture medium, so the medium will support the plant tissue placed on it.

7. The culture medium must be accurately measured into test tubes or Petri dishes.

8. The explant is carefully placed on the culture medium. The work is performed under a LAMINAR AIR FLOW HOOD to reduce contamination by microorganisms.

Stage II

1. The substances in the culture medium cause some of the plant cells to become shoots. The shoots push their way through the surface of the explant. This proliferation of shoots commonly takes from four to six weeks.

2. The shoots are separated or SUBCULTURED and transferred to another culture medium to induce rooting. The subculturing process is performed under the sterilized conditions of the Laminar Air Flow Hood.

Stage III

1. The shoots develop roots. When an adequate root system has formed, the small rooted plants are ready to be transplanted into a soil-based medium and moved into the greenhouse.

Several factors affect the success of plant propagation by tissue culture:

1. Plant parts usually have bacteria or fungi on them. Unless these microorganisms are eliminated, the tissue culture medium will soon be contaminated since it is so rich in nutrients and provides optimum growing conditions for contaminants. A sterile working environment is mandatory. Recontamination can occur during the subculturing phase.

2. The culture medium must contain the correct type and amount of plant nutrients. The knowledge and ability to prepare the culture medium requires considerable expertise and experience.

3. The survival rates are low when explants are very small (< 0.20 mm).

4. Explants that contain the youngest and least differentiated tissues have been successful in a wide range of plant species.

5. Depending on the plant, light may or may not have an affect on the growth and development of the explant. However, light is usually needed for the shoot phase of the tissue culture process.

6. The normal temperature range for tissue culture is 26° to 28°C, but this may vary considerably with different plant species.

Plants that have been propagated commercially and experimentally by tissue culture include:

African violet
Daylily
Hosta Lily
Raspberry
Orchid
Redwood
Table Fern
Iris
Rose

An excellent example of tissue culture is the propagation of orchids. CALLUS growth can be subdivided to produce thousands of cultures. When such cultures are treated with the proper GROWTH REGULATORS, each culture becomes a complete orchid plant that blooms normally, is disease-free, and is an exact replica of the parent plant.

The following equipment and supplies are used in tissue culture: autoclave, Laminar Air Flow Hood, weighing balance, test tubes, flasks, Petri dishes, basic culture medium supplies, pH meter, test tube racks, alcohol, laundry bleach, stirrer, hot plate, distilled water, labelling tape, and markers.

STUDENT WORKSHEET 1

TISSUE CULTURE TERMS AND DEFINITIONS

After reviewing Information Sheet 1 and viewing VAS Slidefilm Introduction to Plant Propagation by Tissue Culture, define the following terms:

a. Clones - ______________________________

b. Tissue culture - ______________________________

c. Explant - ______________________________

d. Subculturing - ______________________________

e. Proliferation - ______________________________

f. Agar - ______________________________

g. Callus - ______________________________

h. Laminar Air Flow Hood - ____________________

i. In vitro - ____________________

j. Growth regulator - ____________________

k. Autoclave - ____________________

TEACHER'S KEY

STUDENT WORKSHEET 1

TISSUE CULTURE TERMS AND DEFINITIONS

After reviewing Information Sheet 1 and viewing VAS Slidefilm Introduction to Plant Propagation by Tissue Culture, define the following terms:

a. Clones - groups of genetically uniform plant material derived from a single parent plant and propagated by vegetative means.

b. Tissue culture - a type of cloning that involves the development of new plants in an artificial medium under aseptic conditions, from very small pieces of plants.

c. Explant - a small piece of plant tissue which is removed from the parent plant for purposes of culture.

d. Subculturing - the process of removing and separating a clump of proliferated shoots and placing them on fresh medium.

e. Proliferation - rapid and excessive cell growth.

f. Agar - a gelatin substance used as a base for a culture growing medium; agar dissolves when heated and solidifies when cooled to form a semi-solid gel.

g. Callus - a mass of unorganized, rapidly dividing cells.

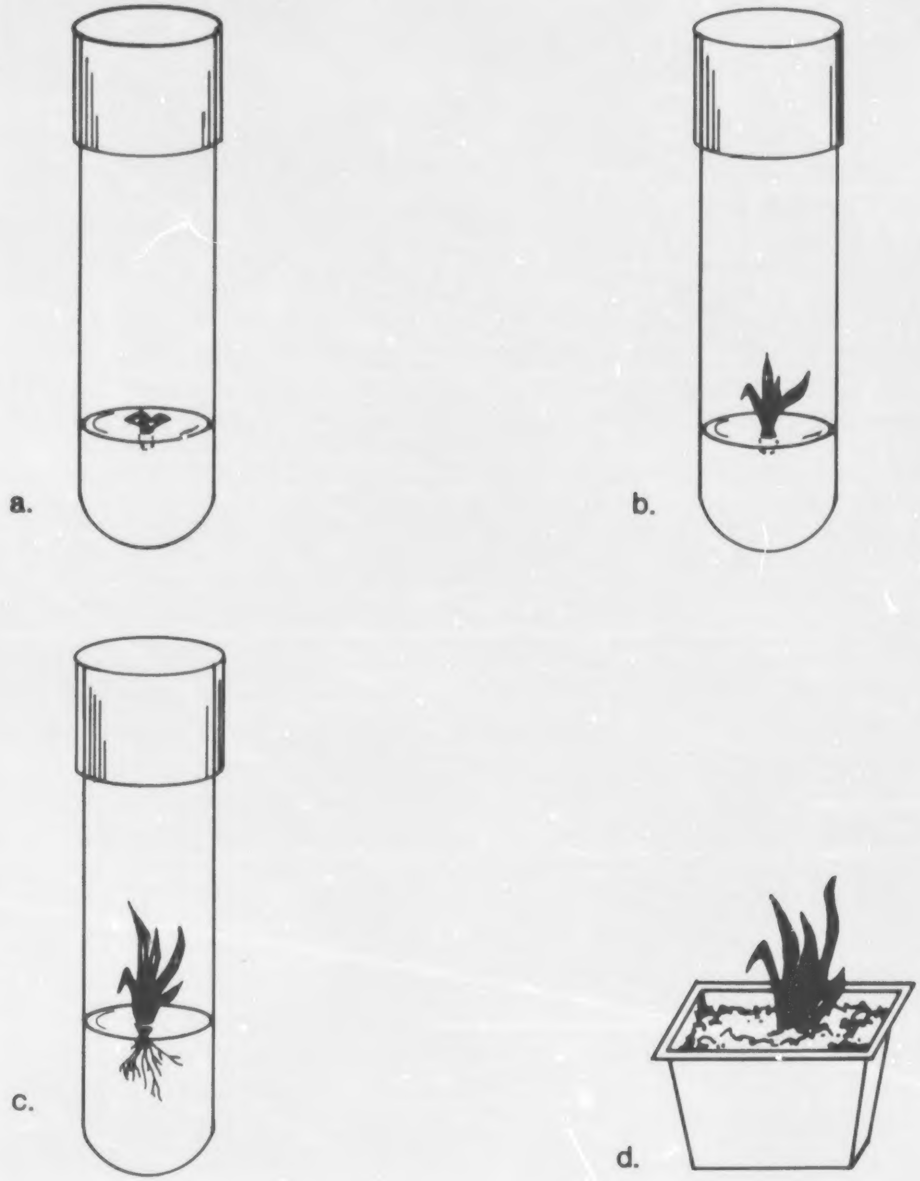
h. Laminar Air Flow Hood - a piece of equipment that provides a continuous outflow of filtered air to prevent fungal spores and bacteria from drifting onto the working surface.

i. In vitro - "in glass"; a term used to describe growing conditions in a closed container.

j. Growth regulator - a substance added to the culture medium that stimulates the development and growth of plant cells and tissues.

k. Autoclave - a piece of laboratory equipment that uses pressurized steam for sterilizing materials and supplies (i.e., test tubes, Petri dishes).

TISSUE CULTURE STAGES



TRANSPARENCY DISCUSSION GUIDE

PROPAGATING PLANTS BY TISSUE CULTURE

I. Transparency--THREE STAGES OF TISSUE CULTURE

   a) Stage I - a suitable explant is placed on a sterilized culture medium.

   b) Stage II - the explant develops shoots; the shoots are subcultured and transferred on to another culture medium to induce rooting.

   c) Stage III - the shoots develop roots.

   d) The small rooted plants are ready to be transplanted into a soil-based medium.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

PROPAGATING PLANTS BY TISSUE CULTURE

SHORT ANSWER:

1. Discuss one advantage and one disadvantage of propagating plants by tissue culture.

   One advantage of propagating plants by tissue culture is the production of a large number of plants that are identical to the parent plant.

   One disadvantage of propagating plants by tissue culture is the creation of a large number of plants of the same genotype that may contain hidden susceptibility to harmful microorganisms.

2. Briefly review the different steps in tissue culture propagation.

   a. A tiny part of the parent plant is placed on a growing medium.

   b. The small plant part begins to develop shoots.

   c. The shoots are subcultured and then develop roots.

   d. The rooted plants are transplanted into a soil-based medium.

3. List 4 plants that can be propagated by tissue culture.

   a. Raspberry

   b. African Violet

   c. Orchid

   d. Hosta

4. Why are aseptic conditions essential during tissue culture?

   Unless sterile conditions are present during tissue culture preparation, the growing medium will become infested with fungal and bacterial organisms.

MATCHING:

Column I

C 1. Genetically uniform plant material derived from one individual plant

A 2. A very small portion of a parent plant

E 3. Removing and separating shoots and placing on fresh medium

Column II

A. explant
B. agar
C. clones
D. tissue culture
E. subculture
F. callus

_B_ 4. Gelatin substance used as a base for culture medium

_D_ 5. Development of new plants in an artificial medium under aseptic conditions

UNIT F: Plant Identification

UNIT F

UNIT F: PLANT IDENTIFICATION

Additional problem areas have not been included in this unit. The project advisory council and staff feel the unit has been adequately covered in Metropolitan Core I, II, and III as follows:

Core I - 1. Identifying and Classifying Plants.
2. Identifying Different Parts and Types of Leaves.
3. Identifying Different Parts and Types of Stems.
4. Identifying Different Parts and Types of Fruits.
5. Identifying Different Parts and Types of Flowers.
6. Identifying Different Parts and Types of Roots.

Core II - 7. Identifying Turfgrasses and Turfgrass Weeds and Using Turfgrasses in the Landscape.
8. Identifying Trees and Shrubs in the Landscape.
9. Identifying Vines and Ground Covers in the Landscape.
10. Identifying and Using Annual and Perennial Flowers in the Landscape.
11. Identifying and Caring for Flowering and Foliage House Plants.

Core III - 12. Reviewing and Applying Plant Identification Skills.

UNIT G: Growing and Managing Horticultural Crops

PROBLEM AREA:

1. Developing crop growing schedules

UNIT G: GROWING AND MAINTAINING HORTICULTURAL CROPS

PROBLEM AREA: DEVELOPING CROP GROWING SCHEDULES

SUGGESTIONS TO THE TEACHER:

This problem area is designed to be used when students are growing horticultural crops in the school greenhouse and/or land laboratory. The student worksheets should be used to record necessary data pertaining to the specific crops grown.

One to two days may be necessary to acquaint students with the importance of crop scheduling. Additional class time should be provided, throughout the school year for students to update and evaluate their crop records.

To assist instructors in using this problem area, the student worksheets have been completed utilizing Easter lilies as an example of a horticultural crop. Instructors are encouraged to adapt the worksheets for the particular crops grown in their school greenhouse and/or land laboratory.

CREDIT SOURCES:

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The teacher's guide, information sheets, student worksheets, and laboratory exercise were developed by Janet L. Henderson, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Kallie S. Grobstein, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Growing and managing horticultural crops

II. Problem area: Developing crop growing schedules

III. Objectives: At the close of this problem area students will be able to:

1. Identify reasons for having crop growing schedules.
2. Plan, implement, and evaluate growing schedules for specific horticultural crops.
3. Maintain appropriate crop growing records.
4. Prepare a year-round schedule for utilizing available greenhouse and/or land laboratory space.

IV. Suggested interest approaches:

1. Conduct a class discussion asking the following lead questions:
   a. Why do we need to develop crop schedule plans?
   b. Why do we need to know when to plant certain crops?
   c. What might be the consequences of not developing or using a crop schedule?
2. Display several stages of floriculture crops (Example: poinsettia cuttings, Easter lily bulbs, or mature pot mums.) Discuss with students the types of activities needed to obtain a saleable plant. Using student input, list on the board a possible growing schedule for a specific crop.

V. Anticipated problems and concerns of students:

1. What is a crop growing schedule?
2. Why should I develop crop schedules?
3. What kinds of records should I keep on my crops?
4. How do I plan a year-round crop schedule?
5. Why should I keep crop records?

VI. Suggested learning activities and experiences:

1. Conduct a study trip to a greenhouse or nursery to observe methods of space utilization and recordkeeping.

2. Have a greenhouse operator or nursery worker discuss techniques for developing crop schedules and keeping records.

3. Have students select the supplies needed for a specific horticultural crop. Information may be obtained from available seed/supply catalogs. Students can compare the unit/total price of the supplies when ordered from different companies. Using the data, encourage students to estimate the approximate selling price for the crop. Use Student Worksheet 1 to plan this activity.

4. Have students plan a year-round crop schedule for the school greenhouse and/or land laboratory. Encourage students to list the crops to be grown for the year (August-July) and to consider the consequences of crop rotation and overlap. Use Student Worksheet 3 to plan this activity.

5. Have students keep an accurate record of cultural practices performed for every crop. Encourage the class to record dates and specific notes for each practice. Use Student Worksheet 2 to plan this activity.

6. Ask students to determine the potential market demand for crops grown in the school greenhouse and/or land laboratory. Have them identify possible retail and wholesale customers. Use this data to determine the number and varieties of crops to produce.

7. Have students plan the arrangement of crops in the school greenhouse and/or land laboratory for an entire year. Ask students to draw, to scale, a floor plan for the available space indicating the number and dimensions of existing benches or nursery rows. Encourage students to determine the number and approximate spacing of plants per bench or row. Use Laboratory Exercise 1 to plan this activity.

8. Assign each student a specific section of the school greenhouse or land laboratory to use for growing a horticultural crop. Have students develop a growing schedule for the crop and maintain appropriate records.

VII. Application Procedures:

1. Students preparing for careers in the horticulture industry need a basic understanding of crop scheduling and recordkeeping principles. Practical experience in the school greenhouse and/or land laboratory will provide opportunities for practicing crop scheduling skills.

2. Recordkeeping and crop scheduling skills should be encouraged for students planning home improvement and SOE projects.

VIII. Evaluation:

1. Evaluate student worksheets.

2. Evaluate student work and record keeping while caring for specific crops during the school year.

IX. References and aids:

1. Nelson, K. S. Greenhouse Management for Flower and Plant Production (2nd ed.). Danville, IL: Interstate Printers and Publishers, 1980.

INFORMATION SHEET 1

REASONS FOR UTILIZING CROP GROWING SCHEDULES

There are several reasons for developing and utilizing crop growing schedules:

1. To provide maximum crop production in the available greenhouse and/or land laboratory space.
2. To predict future sales and anticipate available cash flow.
3. To have a step-by-step record of cultural practices for certain crops.
4. To provide useful information for advertising and marketing schedules.
5. To insure crops are mature and saleable by the targeted market dates.
6. To have an accurate record of supplies and plant materials for proper inventory control.
7. To have an overall, long-term view of space utilization in the greenhouse and/or land laboratory.

Crop schedules need to be planned and evaluated before putting them in operation. Some supplies and materials may need to be ordered several weeks or months in advance of actual use. Inventory counts, harvest dates, and other crop records can be stored on microcomputer discs for future reference. Using the microcomputer to keep crop records will acquaint students with equipment currently being used in the horticulture industry. Regardless of the method employed, recordkeeping is an essential component of any crop schedule plan. The efficient planning, implementing, and evaluating of crop schedules can be achieved through accurate recordkeeping.

INFORMATION SHEET 2

HORTICULTURAL CATALOGS

The following companies have seed/supply catalogs, crop record books, and promotional materials available for student use in planning crop schedules:

1. Ball Seed Catalog
   Ball Seed Co.
   Box 335
   West Chicago, IL 60185
   312-231-3500

2. Park Seed, Flower and Vegetable Catalog
   Geo. W. Park Seed Co., Inc.
   Cokesbury Rd.
   Greenwood, SC 29647

3. Wayside Gardens Catalog
   Wayside Gardens
   Garden Lane
   Hodges, SC 29695

4. Vaughan's Flower and Vegetable Seed Catalog
   Vaughan's Seed Company
   5300 Katrine Ave.
   Downers Grove, IL 60515
   312-969-6300

5. Peters Fertilizers Sales Manual
   Peters Fertilizer Manual
   W. R. Grace and Co.
   Iron Run Industrial Park
   Fogelsville, PA 18051
   215-395-7105

INFORMATION SHEET 3

EASTER LILY FORCING SCHEDULE FOR COMMERCIALLY PRECOOLED BULBS

NOTE: Before potting, dip bulbs for one-half hour in a solution of Kelthane 35% wettable powder using 1 1/3 lbs. in 100 gallons of water. Do not use emulsifiable concentrate form. This will cause damage. Since bulbs could be received prior to start date on the forcing schedule, pot immediately and place the potted bulbs in a 45-50°F house, and leave them there till start of forcing schedule below. If the bulbs cannot be potted immediately, place in 35-40°F storage for as short a duration as possible. Prolonged storage could result in overcooling.

Date	Days before Easter	Stage of plant development
December 21	120	Water thoroughly. Apply either Lesan-Terraclor or Lesan-Benlate. Maintain a 60-62°F soil temperature in the pots.
January 5	105	Roots are forming.
January 16	94	Shoots begin breaking through soil. Repeat Lesan application. If shoots are slow to emerge, long-day treatment at this time will accelerate the bulbs and produce a uniformly timed crop. Light from 10:00 P.M. till 2:00 or 3:00 A.M. Use mum lights (20-25 foot-candles). Light for about 1 week. Give slower emerging bulbs 3 or 4 additional nights of light.
January 26	84	Plants should be 2-4 inches tall. Sort plants and raise temperature gradually on those not through soil or only one-inch tall.
February 7	72	Flower buds should be forming. Sort out most advanced plants and place in cooler area.
February 12	67	Plants should be 3-5 inches tall. Spray for aphids as needed. Leaf-counting method should be initiated at about this time.
February 21	58	Plants should be 6-7 inches tall. Repeat Lesan application. Time to consider the use of a growth regulator such as A-Rest.
March 9	42	Buds should be visible in the growing tip. At 63°F night and 68°F day air temperatures, plants should be marketable in 5 weeks.
March 16	35	Plants should be approximately 8-10 inches tall. Check for aphids.
March 23	28	Buds 1-1½ inches long. Begin to space plants.

March 30	21	Buds should be beginning to turn down. Buds should be 2-3 inches in length. A bud which has swollen and become creamy white is 4 to 7 days from opening at a 55-60°F temperature.
April 12	7	Plants ready for market.
April 19	0	Easter

INFORMATION SHEET 4

EASTER LILY CULTURE TIPS

SOIL

Must be coarse, well drained. 2 parts loam, 2 parts peat moss, 1 part sand. To reduce the possibility of scorch occurring, maintain a pH of 6.5-7 and avoid high phosphorus levels.

FERTILIZER

A general recommendation would be to use a 16-4-12 or 15-0-15 fertilizer at 100-200 ppm each watering. Slow-release fertilizer may be incorporated into the soil after steaming, such as MagAmp or Osmocote, just prior to potting. For soils low in fertility and not to be fertilized by injection, use 15 lbs. of MagAmp or 13 lbs. of Osmocote; mix thoroughly. If soil is to be fertilizer injected, use one half the above rates on slow-release fertilizers. Use soil test as a guide. Begin fertilizing when plants are 1/2 to 1-inch high and continue until buds turn down or approximately two weeks before Easter.

POTTING

POT BULBS UPON RECEIPT AFTER DIPPING IN A SOLUTION OF KELTHANE. Place them deep in the pot to allow for development of stem roots. Center the bulbs in the pot, making sure that the peak of the bulb is centered. Fill the pot with soil mix and firm. Water thoroughly. Drench with Lesan 35% WP (8 oz.) plus Terraclor 75% WP or Benlate 50% WP (8 oz.) in 100 gallons of water. Establish a program of Lesan drenching every 3-4 weeks (see schedule). If bulbs are received prior to starting date on forcing schedule, place potted bulbs in 45-50°F house. Bulbs received with sprouts should be handled in the same manner, but care should be taken not to injure shoots.

REGULATION OF PLANT GROWTH

Beginning with the 120th day before Easter, maintain a 60-62°F soil temperature in the pots. In late January switch to forcing by air temperature. An average of 70°F should do the job (60° nights/80° days). Adjust uniformity of development by moving slower plants to a warmer location and vice-versa. Adjust crop timing according to forcing schedule by raising or lowering temperature (2°). For increase in plant height, use mum lights from 10:00 P.M. - 2:00 A.M. For shorter plants, height may be controlled by growth retardants, such as Phosfon or A-Rest. Pulling black cloth at 5:00 P.M. and removing at 8:00 A.M. from shoot emergence till near flowering will reduce height also.

INSECT CONTROL

Aphids--Vapona, Thiodan
Fungus gnats--Diazinon
Caution: Read label and follow directions!

GENERAL

Uniformity in all aspects of culture cannot be over-emphasized. Pot at the same depth; use the same amount of soil per pot; firm at the same pressure; water uniformly; insure uniform temperature throughout the forcing area.

LEAF-COUNTING METHOD (LCM)

LCM is a method of exacting the established methods of forcing lilies for Easter, whereby actual leaf count is used as a basis for determining state of development. The basis for this method is that lilies initiate all leaves by the time the plant is 4-6 inches high.

Method:

1. When plants are 4-6 inches high, determine the total number of leaves on the crop by selecting 2 or 3 plants from each section or lot and counting (a) the number of leaves which have unfolded off the leaf spindle or stalk and (b) the number of leaves which remain on the spindle.

2. Calculate the leaf-unfolding rate by dividing the number of leaves remaining on the stalk unfolded by the number of days till the first Sunday in Lent. This will give you the number of leaves that must unfold per day.

3. Select several representative plants and mark the last few leaves that have unfolded from the stalk. A paper punch or something similar can be used for this.

4. One week later, determine the actual number of leaves unfolded. Subtract the number of those unfolded in the past week from those yet to unfold, and recalculate the required unfolding rate (step 2). Make the necessary temperature adjustments and then repeat steps 2 and 3.

STUDENT WORKSHEET 1

CROP SUPPLY CHECKLIST

Name of Crop: ______________________ Variety: ______________________

Targeted Market Date: ______________________

Supplies Needed	Description	Source	Amount	Unit $/Total $
1. Cuttings/Seeds:				
2. Containers:				
3. Growing Media:				
4. Soil Amendments:				
5. Fertilizers:				
6. Growth Regulators:				
7. Insecticides:				

8. Fungicides:

9. Miticides:

10. Labels:

11. Other Supplies:

STUDENT WORKSHEET 2

KEEPING CROP RECORDS

Name of Crop: ______________________ Variety: ______________________

Targeted Market Date: ______________________

Cultural Practice	Date Performed	Notes
1. Preparing Growing Media		
2. Planting		
3. Transplanting		
4. Fertilizing		
5. Pinching		
6. Pruning		
7. Disbudding		

8. Lighting ____________ ____

9. Shading ____________ ____

10. Heating ____________ ____

11. Cooling ____________ ____

12. Applying Growth Regulators ____________ ____

13. Applying Insecticides ____________ ____

14. Applying Fungicides ____________ ____

15. Applying Miticides ____________ ____

16. Other Practices ____________ ____

STUDENT WORKSHEET 3

YEAR-ROUND CROP SCHEDULE

Crop	Month											
	A	S	O	N	D	J	F	M	A	M	J	J
1.												
2.												
3.												
4.												
5.												
6.												

LABORATORY EXERCISE 1

PLANNING GREENHOUSE AND/OR LAND LABORATORY SPACE

PURPOSE: The purpose of this laboratory exercise is to provide students the opportunity to arrange crops in the greenhouse and/or land laboratory for an entire school year.

MATERIALS:

1. ruler
2. drawing paper
3. clipboards
4. seed/supply catalogs (optional)

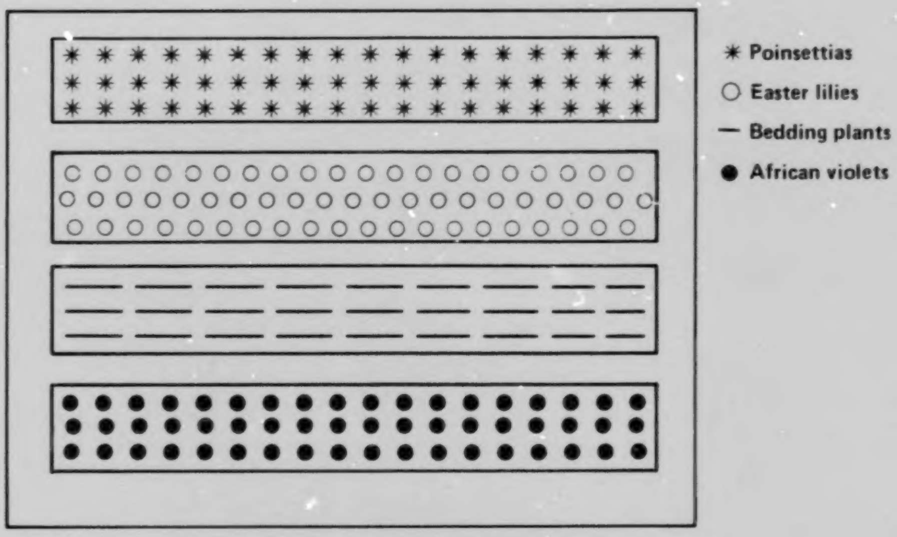
PROCEDURES:

1. Draw to scale (Example: 1/8" = 1'), the dimensions and location of benches or rows in the school greenhouse and/or land laboratory.

2. Organize available space by arranging the planned crops on the greenhouse benches or in the land laboratory rows.

3. Encourage students to practice various crop placement schedules in order to maximize space utilization in the greenhouse and/or land laboratory.

4. The following diagram may be used to guide student work:



NOTE: These crops **would not** be growing in the same greenhouse or during the same time of the year. The example is for illustration only.

TEACHER'S KEY

STUDENT WORKSHEET 1

CROP SUPPLY CHECKLIST

Name of Crop: Easter Lilies Variety: Nellie White

Targeted Market Date: April 12

Supplies Needed	Description	Source	Amount	Unit $/Total $
1. Cuttings/Seeds/Bulbs:	pre-cooled bulbs size: 8/9	Ball Seed Co. Box 335 West Chicago, IL 60185	200 bulbs	.75/$150.00
2. Containers:	6" plastic containers	Ball Seed Co. Box 335 West Chicago, IL 60185	200	.15/$30.00
3. Growing Media:	Ball Growing Mix 1	Ball Seed Co. Box 335 West Chicago, IL 60185	10 3 cubic ft. bags	$4.99/$49.90
4. Soil Amendments:	peat moss	Local garden center	3 bales	$2.99/$10.50
5. Fertilizers:	Peter's Easter Lily Special 16-4-12	W.R. Grace & Co. Fogelsville, PA 18051	1 25 lb. bag	$12.45
6. Growth Regulators:	A-Rest	Ball Seed Co. Box 335 West Chicago, IL 60185	1 quart	$26.70

7. Insecticides:	Diazinon	Ball Seed Co. Box 335 West Chicago, IL 60185	1 4 lb. bag	$17.75
	Plant Fume 103		1 case/12 fumigators	$25.40
8. Fungicides:	Lesan	Ball Seed Co. Box 335 West Chicago, IL 60185	1 3 lb. bag	$24.50
	Terraclor		1 3 lb. can	$ 8.35
	Kelthane		1 3 lb. bag	$16.85
9. Miticides:	Pentac	Ball Seed Co. Box 335 West Chicago, IL 60185	1 1 lb. jar	$17.10
10. Labels:	6" plastic stakes	A.M. Leonard, Inc. Piqua, OH 45356	1000 stakes	$21.40
11. Other Supplies:	Foil/ribbon	Local wholesale florist	4 rolls foil	$1.75/$7.00
			3 bolts ribbon	$1.95/$5.85
			Total Price	$423.75

TEACHER'S KEY

STUDENT WORKSHEET 2

KEEPING CROP RECORDS

Name of Crop: Easter Lilies
Variety: Nellie White

Targeted Market Date: April 12

Cultural Practice	Date Performed	Notes
1. Preparing Growing Media	12-10	added 1 part peat moss to 2 parts Bali Growing Mix
2. Planting	12-21	dipped bulbs for 1/2 hr. in Kelthane 35WP; placed bulb deep in center of pot; drenched with Lesan-Terraclor
3. Transplanting	NA	
4. Fertilizing	Continuous	562 ppm nitrogen every 10 days; used Peter's Easter Lily Special (16-4-12)
5. Pinching	NA	
6. Pruning	NA	
7. Disbudding	NA	

8. Lighting	1-16 - 1-23	lights on from 10 pm to 2 am to encourage slow shoots to emerge
9. Shading	NA	
10. Heating	--	moved slower plants to warmer location (60°F nights/ 80°F days)
11. Cooling	--	
12. Applying Growth Regulators	2-21	applied A-Rest to control height
13. Applying Insecticides	2-21 & 3-16	sprayed for aphids
14. Applying Fungicides	1-16 & 2-21	repeated Lesan-Terraclor applications
15. Applying Miticides	NA	
16. Other Practices		

TEACHER'S KEY

STUDENT WORKSHEET 3

YEAR-ROUND CROP SCHEDULE

Crop	A	S	O	N	D	J	F	M	A	M	J	J
1. Poinsettias	─	─	─	─	→							
2. Pot Mums	─	─	─	─	─	→						
3. Easter Lilies					─	─	─	─	→			
4. Foliage Plants	─	─	─	─	─	─	─	─	─	─	─	→
5. Bedding Plants					─	─	─	─	─	→		
6. African Violets							─	─	─	→		

UNIT H: Identifying and Controlling Pests of Horticultural Plants

UNIT H: IDENTIFYING AND CONTROLLING PESTS OF HORTICULTURAL PLANTS

Additional problem areas have not been included in this unit. The project advisory council and staff feel the unit has been adequately covered in Metropolitan Core I, II, and III as follows:

Core I - 1. Pest Identification and Safe Use of Pesticides.

Core II - 2. Identifying and Controlling Landscape and Garden Pests.

Core III - 3. Handling Pesticides Safely and Passing Certification Tests.

UNIT I: Urban Animals

UNIT I

UNIT I: URBAN ANIMALS

Additional problem areas have not been included in this unit. The project advisory council and staff feel the unit has been adequately covered in Metropolitan Core I as follows:

Core I -
1. Care and Feeding of the Family Dog.
2. Care and Feeding of the Family Cat.
3. Care and Feeding of the Family Horse.

UNIT J: Soil Science and Conservation of Natural Resources

PROBLEM AREA:

1. Growing plants hydroponically

UNIT J: SOIL SCIENCE AND CONSERVATION OF NATURAL RESOURCES

PROBLEM AREA: GROWING PLANTS HYDROPONICALLY

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. This problem area can be taught at any time during the school year.

The estimated instructional time for this problem area is 3-7 days depending on how far the teacher wishes to go in developing specialized hydroponic skills. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets, student worksheet, laboratory exercises, transparency discussion guide, and test questions were developed by Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois and reviewed by Paul E. Hemp, Janet L. Henderson, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Soil science and conservation of natural resources

II. Problem area: Growing plants hydroponically

III. Objectives: At the close of this problem area, students will be able to:

1. Define hydroponics.
2. List materials and steps necessary in establishing a hydroponic garden.
3. Maintain a small hydroponic garden.
4. Explain the functions of the major nutrients in plant growth, and identify nutrient deficiencies.

IV. Suggested interest approaches:

1. To generate initial interest, ask the following lead questions:
    a. Is it possible to grow plants without soil?
    b. What would be some advantages and disadvantages of growing plants without soil?
2. Show the movie Hydroponics, available through the Illinois Film Service.
3. Construct a display of several types of vitamins (1-a-Day, Theragram, Geritol, etc.). Compare the importance of a balanced meal and staying healthy for people, to the importance of nutrients and promoting plant growth.
4. Show the students two plants, one in soil and the other in a soilless medium, have them list reasons why they think one plant will grow better than the other.

V. Anticipated problems and concerns of students:

1. What is hydroponics?
2. What materials do I need to construct a hydroponic garden?
3. What plants are best suited for a hydroponic garden?
4. How do I maintain a hydroponic garden?
5. What are the advantages and disadvantages of growing plants hydroponically?

6. Why do we add nutrients to plants grown hydroponically?

7. Why do we need to test the pH level of the water in a hydroponic garden?

VI. Suggested learning activities and experiences:

1. Compare and contrast the different types of hydroponic gardens, utilizing the transparencies and transparency discussion guides included in this problem area.

2. Have the students construct several types of hydroponic gardens in the classroom using the transparencies or Laboratory Exercises in this problem area.

3. Have the students keep records of the plants grown in a classroom hydroponic system, using Student Worksheet 1.

4. Divide the students into small groups and challenge each group to produce a list of advantages and disadvantages of growing plants hydroponically.

5. Invite the owner/manager of a hydroponic production greenhouse to speak to the class. Information sheet 5 identifies hydroponic greenhouses in Illinois.

6. View the film Hydroponics distributed by the Illinois Film Service.

7. Demonstrate the importance of plant nutrients, by preparing a nutrient deficient solution and a normal solution as a control. Have students maintain records and compare/contrast the plants grown in the two solutions. Information sheet 3 will assist students in identifying specific nutrient deficiences.

8. Tour a hydroponic facility in your community if available, using Information Sheet 5 to identify possible sites.

9. Test the pH level of the nutrient solution in a hydroponic garden and adjust it to the proper range using Laboratory Exercise 3.

10. Construct a water culture hydroponic garden using Laboratory Exercise 1, and keep records of plant growth using Student Worksheet 1.

11. Construct an aerated waterculture hydroponic garden using Laboratory Exercise 2, and keep records of plant growth using Student Worksheet 1.

12. Compare plant growth between an aerated and non-aerated growth medium using Laboratory Exercises 1 and 2.

VII. Application procedures:

1. Growing plants hydroponically introduces students to an alternate growing media. This media will gain importance as the land available for food production decreases.

2. The knowledge and skills gained in this problem area can be applied towards student S.O.E. or science fair projects.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate the student's worksheets and laboratory exercises.

IX. References and aids:

1. Douglas, J. S. Hydroponics - The Bengal System. Oxford University Press, Ely House, London, England, 1970.

2. Resh, H. M. Hydroponic Food Production. Woodbridge Press, Box 6189, Santa Barbara, California 93111, 1978.

3. Carpenter, T. Hydroponics - a Handbook for Beginners, Hobbyists and Commerical Growers. Hydro-Gardens, Colorado Springs, CO, 1979.

4. Kenyon, S. Hydroponics for the Home Gardens. Von Nostrand Reinhold Ltd., Toronto, New York, 1979.

5. Horticulture Facts, Cooperative Extension Service, University of Illinois at Urbana-Champaign, College of Agriculture.

   a. Hydroponics, VC-19-82

6. Hydroponics, a 12 minute film available from the University of Illinois Film Center, 1325 South Oak Street, Champaign, Illinois 61820. In Illinois call toll free (1-800-252-1357).

INFORMATION SHEET 1

HYDROPONICS

Hydroponics is a term used to describe several methods of growing plants without soil. The word hydroponics is derived from the latin "hydro" and "ponic," meaning water-working. Other terms used to describe these methods are waterculture, nutriculture, aquaculture, gravel or sand culture, soilless culture solution or liquid culture, nutriponics, and nutrient film technique.

Regardless of the method that is used to grow plants, several basic requirements must be met. These include: physical support, water, air (carbon dioxide and oxygen), mineral salts, adequate light, and favorable temperature.

Plants have been grown hydroponically for hundreds of years. Records show that the Hanging Gardens of Babylon (one of the seven ancient wonders of the world) used a crude form of hydroponics. Scientists of the 1800's first documented evidence that plant life could be sustained in an aggregate and nutrient solution. The term hydroponics is credited to W. F. Gericke of California. He demonstrated that plants could be grown to maturity without soil, provided that the roots of the plant were immersed in a nutrient solution.

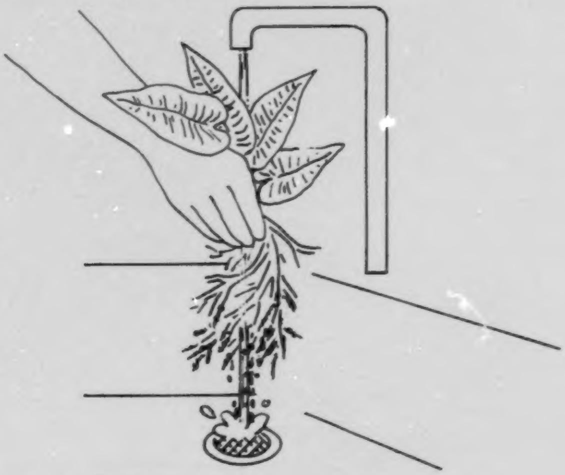
One of the main advantages of growing plants hydroponically is that food may be produced in areas with poor or no soil. During World War II many submarines were equipped with hydroponic systems to provide our seaman with fresh-grown vegetables. Many nations in arid and desert climates also depend on hydroponic systems for food production.

Plants grown in a hydroponic system grow faster, ripen earlier, and yield ten times more than soil grown plants. The flavors of hydroponically grown vegetables are increased, however, the nutritional value stays the same.

Some of the most popular plants grown hydroponically are vegetables and herbs. House plants and flowering plants also may be grown hydroponically. Plants grown hydroponically are much more flavorful than those found in the grocery store, because they don't spend any time in storage. Suggested plants for beginners include tomatoes, lettuce, celery, and herbs. These plants suffer from the most taste loss in the grocery stores.

If starting plants by seed, select varieties that are recommended for container gardens. Some examples are the patio tomato or self-pollinating cucumbers. When using the flood and drain method, start your seedlings in small jiffy pots inserted in the growing medium. Seeds can be planted closer together than the seed packages indicate. The growing box should be placed in an area that is warm (60° - 70° F). Most seeds germinate best when placed in a dark area, so cover growing medium with dark plastic. Make sure that the plastic is removed as soon as the seeds begin to sprout.

Plants started in soil mixtures may also be transplanted into a hydroponic garden. Carefully wash off all the soil from the root system before inserting it into the hydroponic garden.



If you use lukewarm to cold water, fewer signs of shock will be shown by the plants.

Cuttings may also be rooted in a hydroponic garden. Rooting can be promoted in a hydroponic garden using the same procedure for a soil garden by using a rooting hormone.

Controlling the pH level is necessary for a successful hydroponic garden. Plants and especially vegetables do best in a pH of 5.6-6.5 which is slightly acidic. Water in some areas of Illinois have a pH level of 8, which is very alkaline. A pH above or below the recommended level will inhibit the plant's ability to take up nutrients necessary for plant growth. The pH level of your garden should be checked regularly. Instructions for checking and adjusting the pH are listed in Laboratory Exercise 3.

INFORMATION SHEET 2

SOURCES OF HYDROPONIC EQUIPMENT AND SUPPLIES

1. Aqua-Ponics
17221 E. 17th St.
Santa Anna, California
92701

2. Cambridge Farms
8748 S. Todd Ave.
Warren, Ohio
44481

3. Hydro-Gardens, Inc.
P.O. Box 9707
Colorado Springs, Colorado
80932

4. North American Greenhouse Co., Inc.
Box 5286
Texarkana, Texas
75501

5. Edgecomb Enterprises
2560 Federal Drive Suite 703
Decatur, Illinois
62526

NUTRIENTS ONLY

6. Consolidated Laboratories
Suite 118
910 S. Hohokam Drive
Tempe, Arizona
85281

INFORMATION SHEET 3

SOURCES, FUNCTIONS, AND DEFICIENCY SYMPTOMS OF PLANT NUTRIENTS

Nutrient Source	Function	Deficiency Symptom
1. Nitrogen - a. Potassium nitrate b. Sodium nitrate c. Calcium nitrate	an essential ingredient in photosynthesis, aids in leaf and stem growth	slow growth rate, leaves turn yellow to light green beginning with the lower leaves
2. Potassium - a. Potassium sulfate b. Potassium chloride	needed for the development of fruits	lower leaves turn brown and curl up
3. Phosphorus - a. Treble superphosphate	used by the cells during photosynthesis	underdeveloped root systems, leaves turn blotchy and grey
4. Magnesium - a. Magnesim sulphate b. Magnesium nitrate	a component of chlorophyll	leaves turn yellow white, veins remain green. buds do not develop
5. Calcium - a. Calcium sulphate	increases root growth and helps plant absorb potassium	leaves do not develop fully and are unusually small
6. Iron - a. Ferrous sulphate b. Ferric chloride c. Ferric citrate	helps produce chlorophyll	veins remain green and leaves begin to lose color from the tips down
7. Manganese - a. Manganese sulphate b. Manganese chloride	helps the plant absorb nitrogen	buds do not open

Nutrient Source	Function	Deficiency Symptom
8. Boron - a. Boric acid b. Borax c. Copper sulphate	needed in minute amounts, exact function unknown	leaves become spindaly and brown tips develop on leaves
9. Zinc - a. Zinc sulphate	helps transfer other nutrients in the plant	growth rate slows down or ceases

INFORMATION SHEET 4

ADVANTAGES AND DISADVANTAGES OF GROWING PLANTS HYDROPONICALLY

ADVANTAGES

1. Crops can be grown where the soil is unsuitable, unavailable, or contaminated with toxic substances.
2. Labor for traditional practices such as watering, cultivating, mulching, weeding, and applicating herbicides and insecticides can be reduced or eliminated.
3. Higher yields are produced hydroponically, than in field production because plants do not compete with one another for nutrients and can be grown closer together.
4. Soil-borne insects and diseases are avoided.
5. Water and nutrients are recycled in a hydroponic system. This leads towards conservation of valuable resources.
6. Greater control of the environment (light, temperature, nutrients, humidity and composition of air) is possible.
7. Due to greater control of the plants' environment, greater uniformity of plant growth is experienced.
8. Equipment can be automated to further reduce labor costs.
9. The amateur horticulturist or homeowner can adapt a hydroponic system to urban situations.

DISADVANTAGES

1. The plants' reactions to poor conditions are very fast, so plant growth must be monitered every day.
2. Considerable technical knowledge is necessary to handle any problems that may arise.
3. In large production operations, the original cost per acre is higher than field production.
4. Diseases spread faster in a closed hydroponic system, than in field conditions.
5. All plants do not adapt easily to hydroponic systems, so new plant varieties must be developed.

INFORMATION SHEET 5

HYDROPONIC FACILITIES IN ILLINOIS

1. Arthur, Daniels, Midland Co. (A.D.M.)
   Decatur, Illinois
   Commercial vegetable production

2. Edgecombe Enterprises
   2560 Federal Drive, Suite 703
   Decatur, Illinois 62526
   Manufacturers of hydroponic systems (available for tours)

3. Joliet Junior College, Horticulture Department
   Building A
   1216 Houbolt Avenue
   Joliet, Illinois 60436
   Educational hydroponic facilities

4. Robert Burke Greenhouses
   R. R. #3
   Rochelle, Illinois 61068
   (815) 562-7550
   Commercial tomato production

STUDENT WORKSHEET 1

RECORDING PLANT GROWTH IN A HYDROPONIC GARDEN

PROCEDURE: Record observations of your hydroponic garden at least two times per week using the checklist provided below. The instructor may wish to add additional questions.

OBSERVATION CHECKLIST

1. Are the plants receiving sufficient light?

   ____

2. Is the area properly ventilated?

   ____

3. Are drafts present?

   ____

4. Is the working area clean and neat?

   ____

5. Is the proper depth of nutrient present in the growing box?

   ____

6. Is there proper drainage?

   ____

7. What is the pH of the nutrient solution?

   ____

8. Measure the height of the plants.

   ____

9. Record the day that flowers appear.

   ____

10. When harvesting vegetables, record the data and describe the weight and size.

    ____

11. Are insects present? Record method of control and results.

    ____

12. Are diseases present? Record method of control and results.

    ____

STUDENT WORKSHEET 1 (CONT'D)

HYDROPONIC GARDEN DAILY LOG

Observations of Plant Environment and Growth

Date: (Example) March 3rd Cloudy weather, low light; good drainage; proper depth of nutrient solution. Plants 3" in height. No insects, no diseases, area clean and neat. pH level ok, 6.0.	Date:

LABORATORY EXERCISE 1

WATERCULTURE

PURPOSE: The purpose of this laboratory exercise is to observe and record plant growth in a water solution supplied with nutrients, without bubbling air through the solution.

MATERIALS:

1. complete nutrient solution
2. a glass jar
3. aluminum foil
4. cotton
5. cork to fit glass jar
6. plant material (small houseplant, vegetable or soybean plant seedling)

PROCEDURES:

1. Select a well rooted plant, and remove all soil particles from root system.
2. Cut a slot in the cork for the plant.
3. Wrap cotton around the stem of the plant where it will be in contact with the cork.
4. Insert cotton wrapped plant into slot of cork.
5. Fill jar with nutrient solution.
6. Fit cork into top of jar carefully so the root system of the plant is not injured.
7. Wrap aluminum foil around the jar to keep out the light. This will prevent growth of bacteria in the nutrient solution.
8. Place jars in a well lit area.

LABORATORY EXERCISE 2

AERATED WATERCULTURE

PURPOSE: The purpose of this laboratory exercise is to observe and record plant growth in an aerated water solution supplied with nutrients.

MATERIALS:

1. complete nutrient solution
2. glass jar
3. aluminum foil
4. cotton
5. cork to fit glass jar
6. air supply, tubes and hoses (air pump from aquarium can be used)
7. plant material (houseplant, vegetable or soybean plant seedling)

PROCEDURES:

1. Select a well rooted plant, and remove all soil particles from root system, by washing it gently under running water.

2. Cut a slot in the cork for the plant and air hose.

3. Wrap cotton around the stem of the plant where it will be in contact with the cork.

4. Insert cotton-wrapped plant into the slot of the cork.

5. Fill jar with nutrient solution.

6. Fit the cork into the top of the jar carefully so the root system of the plant is not injured.

7. Wrap aluminum foil around the jar to keep out the light. This will help prevent the growth of bacteria in the nutrient solution.

8. Connect the air supply to the jar.

9. Place the jar in well lighted area.

10. Record observations, compare growth of plants in aerated solution to the plants in a non-aerated solution.

LABORATORY EXERCISE 3

TESTING AND ADJUSTING THE pH LEVEL OF A HYDROPONIC GARDEN

PURPOSE: The purpose of this laboratory exercise is to test the pH level of the nutrient solution, and adjust it to a recommended level if necessary.

MATERIALS:

1. established hydroponic garden and nutrient solution
2. litmus paper or indicator solution
3. white vinegar or phosphoric acid
4. baking soda or dolamitic lime
5. water
6. measuring spoons

PROCEDURES:

1. Test the nutrient solution with the litmus paper or indicator solution.
2. Compare the color of the litmus paper or indicator solution to a chart. If the color indicates the pH is between 5.6-6.5 the solution is within the proper range.
3. If the solution is too alkaline (6.5 or above), add 1 tablespoon of white vinegar to 3 gallons of water.
4. Slowly add part of this mixture to the nutrient solution.
5. Stir thoroughly and check the pH again.
6. Continue this process until the nutrient solution reaches the desired range.
7. If the solution is too acid (5.6 or lower), add one tablespoon of baking soda to three gallons of water.
8. Slowly add part of this mixture to the nutrient solution.
9. Stir thoroughly and check the pH again.
10. Continue this process until the nutrient solution reaches the desired range.

LABORATORY EXERCISE 4

CONSTRUCTING A PORTABLE FLOOD & DRAIN HYDROPONIC GARDEN

PURPOSE: The purpose of this laboratory exercise is to construct a small hydroponic garden that can support four to six plants.

MATERIALS:

1. wooden box or plastic tub 8"-12" deep
2. plastic liner (for wooden box)
3. inert aggregate (sand, perlite, vermiculite, gravel, etc)
4. complete nutrient solution
5. plastic bucket
6. small piece of screen
7. 4-6 plants of your choice
8. a wooden or plastic door stop

PROCEDURES:

1. Line wooden box with plastic.

2. Drill a hole at one end of the wooden or plastic box.

3. Slope the box in the direction of the hole by placing the door stop under the opposite end of the box.

4. Place the screen over the hole to prevent loss of aggregate.

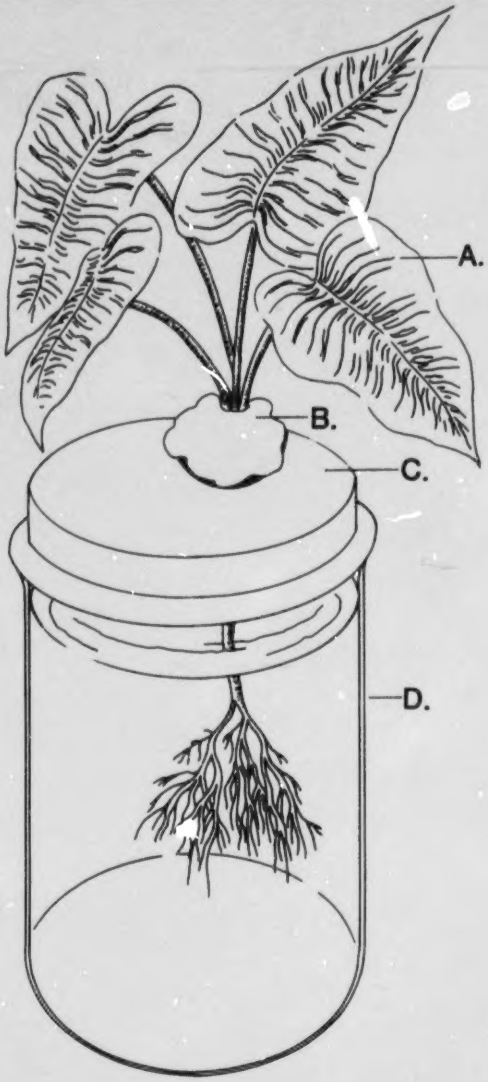
5. Fill the box with the inert aggregate.

6. Place plants in the growing medium.

7. Water plants with the nutrient solution two times per day.

8. Place the plastic bucket under the drainage hole so the nutrient solution can be saved and reused.

WATERCULTURE



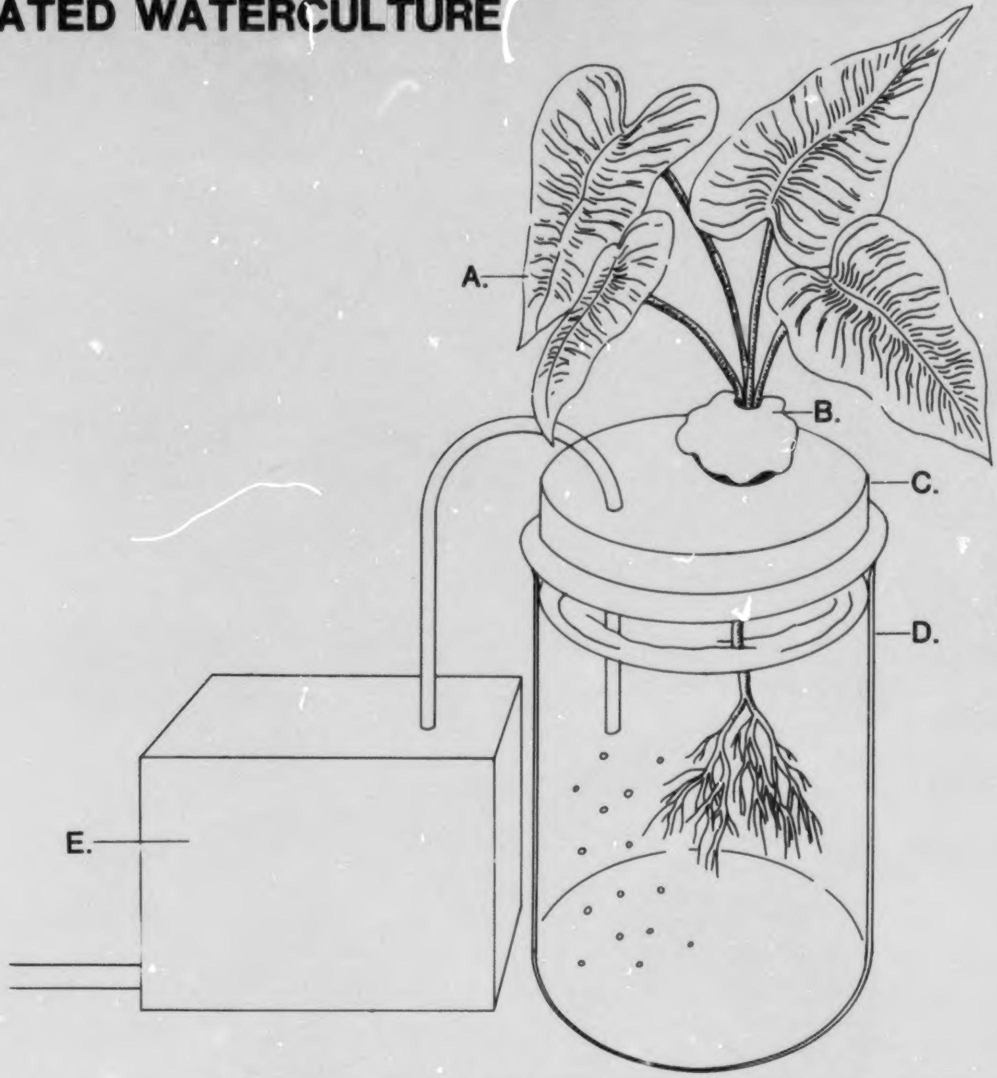
A. PLANT

B. COTTON

C. CORK

D. GLASS JAR

AERATED WATERCULTURE



A. PLANT

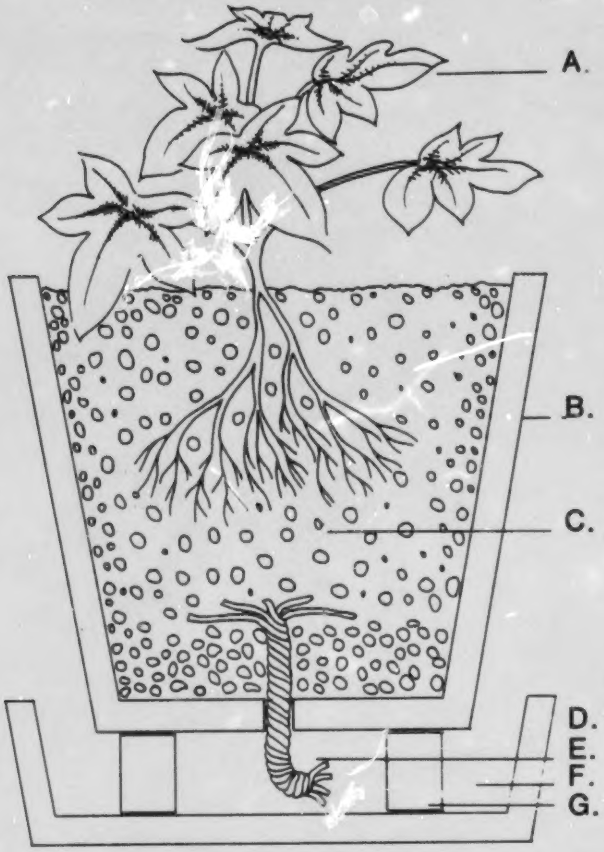
B. COTTON

C. CORK

D. GLASS JAR

E. AIR PUMP

WICK-WATERING METHOD



A. PLANT

B. FLOWERPOT

C. AGGREGATE

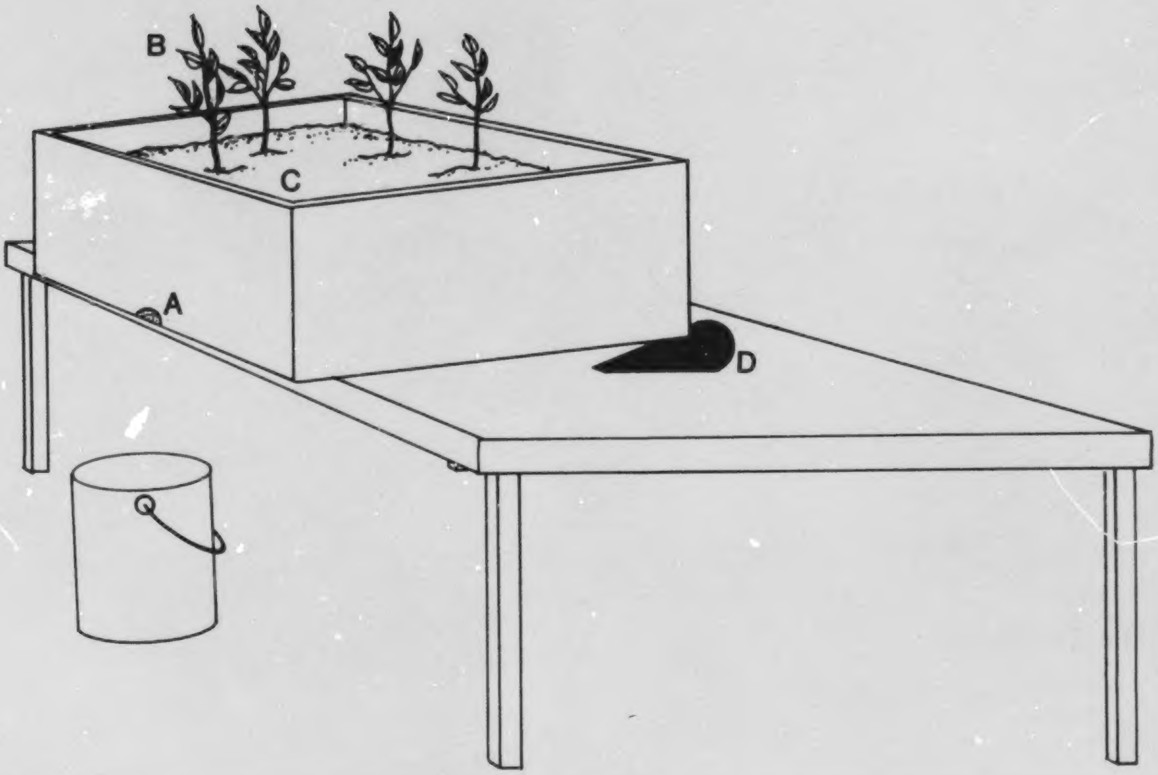
D. LARGE SAUCER

E. WICK

F. SOLUTION

G. BLOCKS

FLOOD AND DRAIN METHOD



A. SCREEN

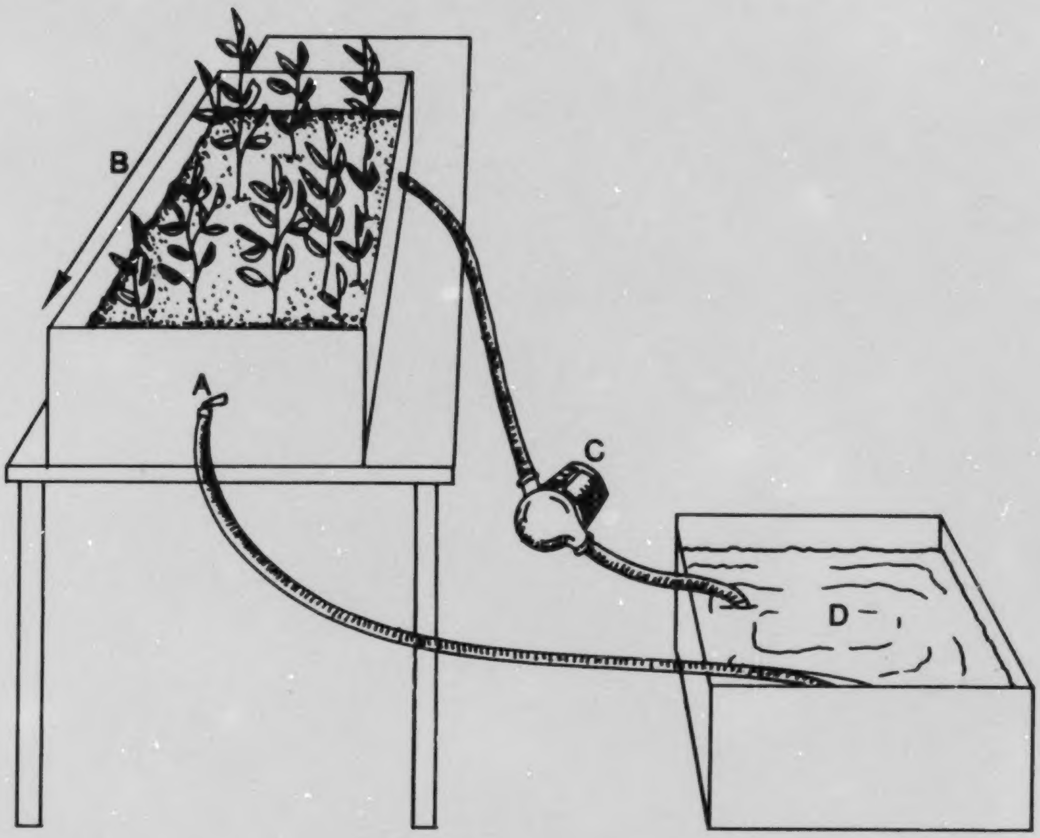
B. PLANT

C. AGGREGATE

D. DOORSTOP

E. PAIL

AUTOMATED HYDROPONIC GARDEN



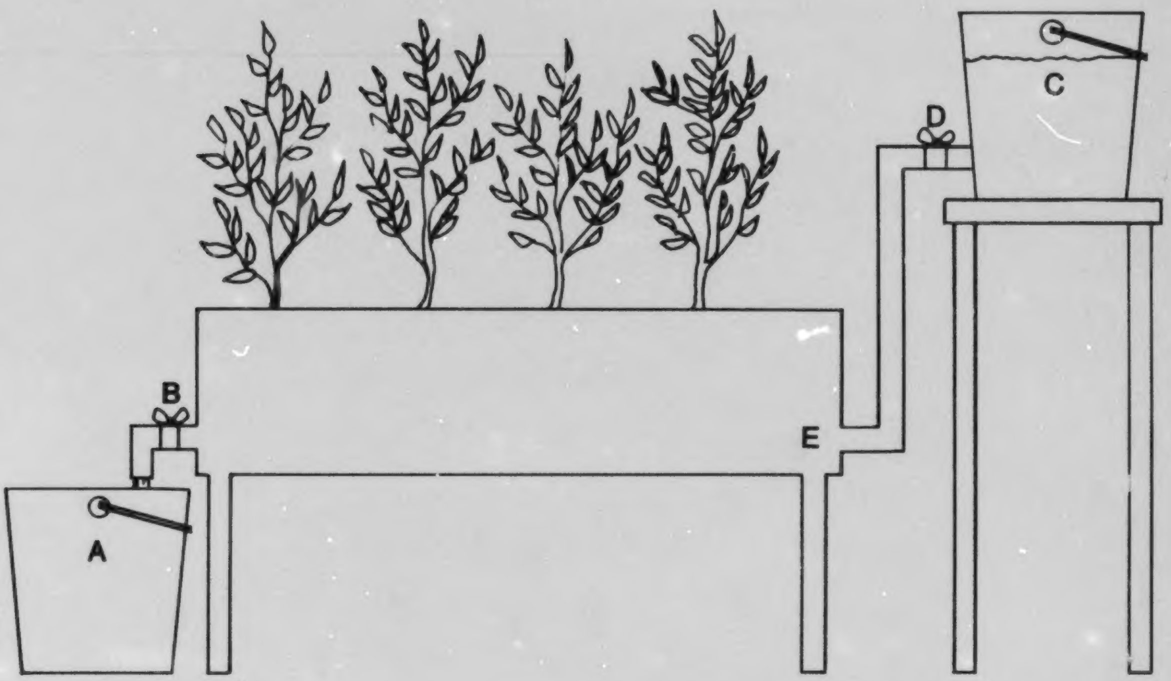
A. VALVE

B. SLOPE

C. PUMP

D. TANK FOR SOLUTION

FLOOD AND DRAIN HYDROPONIC GARDEN



A. NUTRIENT IS COLLECTED HERE

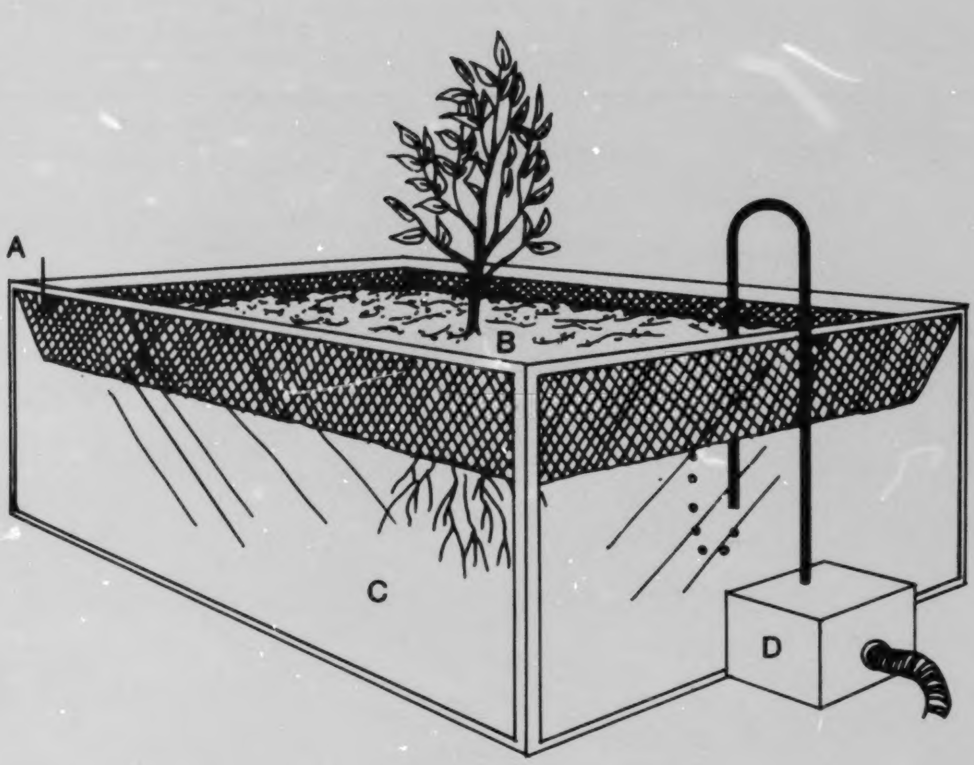
B. VALVE

C. NUTRIENT SOLUTION RAISED ABOVE GROW BOX

D. VALVE

E. RAISED GROWBOX

AQUARIUM HYDROPONIC GARDEN



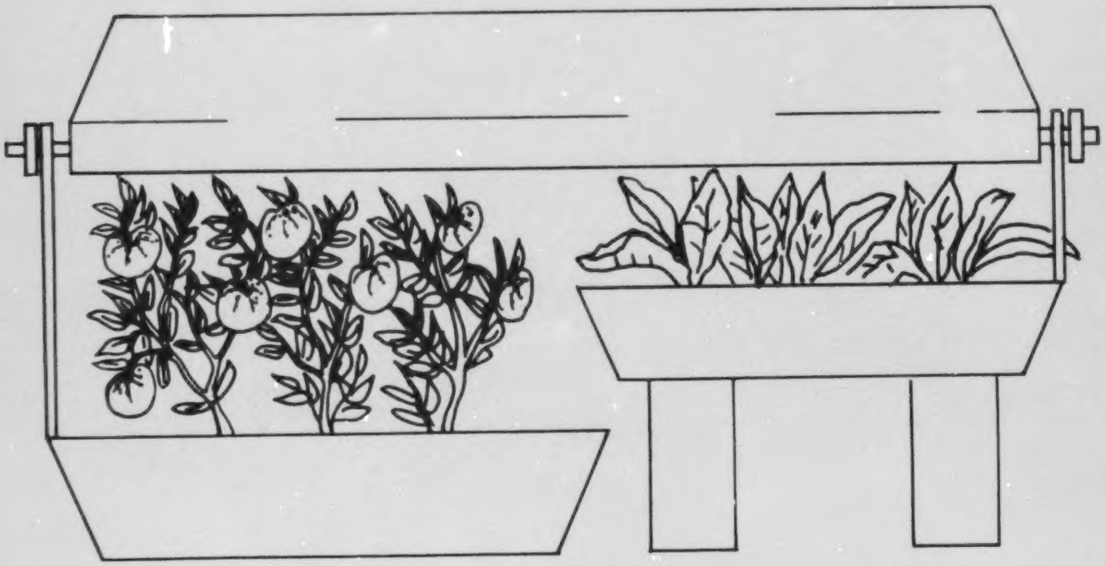
A. SCREEN THAT WILL ALLOW ROOT PENETRATION

B. INERT AGGREGATE

C. NUTRIENT SOLUTION

D. AQUARIUM PUMP FOR AERATION

HYDROPONIC GARDEN UNDER ARTIFICIAL LIGHTS



TRANSPARENCY DISCUSSION GUIDE

GROWING PLANTS HYDROPONICALLY

I. Transparency--WATERCULTURE

A. Water culture is the least complicated form of hydroponics. A plant is simply placed in a water and nutrient solution.

B. The jar should be covered with aluminum foil to block out the light. This will prevent the growth of bacteria in the nutrient solution.

II. Transparency--AERATED WATERCULTURE

A. The aerated waterculture system is identical to the waterculture system except that a small pump is bubbling air through the nutrient solution.

B. The air will provide the root system with oxygen, which is necessary for plant growth.

III. Transparency--WICK-WATERING METHOD

A. Plants may be grown in individual flower pots by using the wick-watering method. A plant potted in an aggregate is placed in a saucer containing a nutrient solution. It is fed by a wick that has one end inserted into the pot from the bottom, and the other end immersed in the nutrient solution.

IV. Transparency--FLOOD AND DRAIN METHOD

A. An inexpensive hydroponic garden can be constructed from a wooden box or plastic tub.

B. The box is placed on a slope by a doorstop to aid nutrient drainage.

C. Excess solution is collected by a plastic pail placed beneath the drain hole.

V. Transparency--AUTOMATED HYDROPONIC GARDEN

A. A continuous flow of nutrients can be provided by the use of a pump.

VI. Transparency--FLOOD AND DRAIN HYDROPONIC GARDEN

A. A larger more permanent garden can be constructed by using the same princples as the smaller unit constructed in Laboratory Exercise 4.

VII. Transparency--AQUARIUM HYDROPONIC GARDEN

A. An unused aquarium can be turned into a hydroponic garden.

B. Foil should be used to block the light to the nutrient solution.

VIII. Transparency--GARDEN UNDER ARTIFICIAL LIGHTS

A. Hydroponic gardens may be grown indoors with the aid of artifical lights.

B. Vegetables need higher light levels than green plants.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

GROWING PLANTS HYDROPONICALLY

TRUE OR FALSE:

True 1. Nutriculture and waterculture are other names used for hydroponics.

True 2. Hydroponics is a term used to describe plants growing without soil.

False 3. Plants grown hydroponically do not have to meet the same cultural requirements as plants grown in soil.

True 4. Growing plants hydroponically has been known to man for hundreds of years.

True 5. Vegetables grown hydroponically grow faster and taste better than field grown vegetables.

True 6. One advantage of hydroponics is that plants may be grown in areas with poor soils.

False 7. A limited growing season is a major disadvantage to hydroponics.

False 8. An advantage of hydroponics is that it is not necessary to add nutrients or fertilizer to the water solution.

True 9. Plants with light green leaves that grow slowly show a possible nitrogen deficiency.

False 10. Most vegetables grow best in a pH of 6.5-7.5.

SHORT ANSWER:

1. List four advantages of growing plants hydroponically.
    a. plants can be grown where soil is unsuitable or contaminated.
    b. soil borne insects and diseases are avoided.
    c. water and nutrients are recycled.
    d. equipment can be automated to reduce labor.

2. List two disadvantages of growing plants hydroponically.
    a. diseases spread faster.
    b. in large production operations, the cost per acre is high.

3. List three primary nutrients essential for plant growth.

   a. nitrogen
   b. phosphorus
   c. potassium

4. List four types of plants that may be grown hydroponically.

   a. vegetables
   b. herbs
   c. green plants
   d. flowering plants

5. Name two types of inert media used as a growing media for hydroponics.

   a. sand
   b. gravel

6. Why is it important to maintain the proper pH?

   Plants are not able to absorb essential nutrients unless the pH is between 5.6-6.5.

7. Define the term hydroponics.

   The method of growing plants without soil. Literal translation from Latin means water working.

8. Explain why non-aerated waterculture hydroponic systems are not as effective as an areated hydroponic system.

   Oxygen is not provided to the root system, plant growth slows and the plant may eventually die.

UNIT K: Horticultural Agricultural Products

UNIT K: AGRICULTURAL PRODUCTS

Additional problem areas have not been included in this unit. The project advisory council and staff feel the unit has been adequately covered in Metropolitan Core II, and III as follows:

Core II - 1. Identifying and Selecting Fresh Fruit and Vegetables.

2. Identifying and Selecting Ornamental Horticultural Products.

Core III - 3. Selecting and Buying Horticultural Tools and Equipment.

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UNIT L: Landscape Design, Establishment, and Maintenance

PROBLEM AREAS:

1. Pruning deciduous shrubs
2. Pruning deciduous shade trees
3. Pruning bonsai, espalier, topiary, vines, and roses
4. Using mulches in the landscape
5. Growing plants in containers

UNIT L: LANDSCAPE DESIGN, ESTABLISHMENT, AND MAINTENANCE

PROBLEM AREA: PRUNING DECIDUOUS SHRUBS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended time for teaching this problem area is during the late winter or early spring months.

The estimated instructional time for this problem area is 5 to 7 days, depending on how far the teacher wishes to go in developing deciduous shrub pruning skills at the third year level. If the teaching plan is limited to classroom discussion with little or no practical experiences or observations, the instructional time can be less than five days. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

The instructor is encouraged to refer to Metropolitan Core Curriculum III - Unit L, Problem Area: Pruning Evergreens, to obtain information on pruning evergreen shrubs and trees.

CREDIT SOURCES:

These materials were developed through a funding agreement, R-33-24-D-0362-466 with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed, as policy or opinion of the Illinois State Board of Education or its staff.

The teacher's guide, information sheet, student worksheet, laboratory exercises, transparency guide, and test questions were developed by Janet L. Henderson, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Kallie S. Grobstein, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

Transparency masters were prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Landscape design, establishment, and maintenance

II. Problem area: Pruning deciduous shrubs

III. Objectives: At the close of this problem area, students will be able to:

1. Identify the reasons for pruning deciduous shrubs.
2. Identify the proper techniques for pruning deciduous shrubs.
3. Demonstrate the correct procedures for pruning deciduous shrubs.
4. Follow safety procedures when pruning decidious shrubs.

IV. Suggested interest approaches:

1. Conduct a walking tour of the high school campus to observe proper and improper pruning of deciduous shrubs.
2. Take a trip to a local nursery or garden center to observe the pruning of deciduous shrubs.
3. Asked students if they have pruned deciduous shrubs. Have them discuss types of pruning techniques and tools they used and any problems they encountered.
4. Have students demonstrate practical applications of pruning evergreen shrubs by reviewing Metropolitan Core Curriculum III - Unit L, Problem area: Pruning Evergreen Shrubs.

V. Anticipated problems and concerns of students:

1. What are the reasons for pruning deciduous shrubs?
2. What tools should I use for pruning decidious shrubs?
3. When should I prune deciduous shrubs?
4. How should I prune deciduous hedges?
5. What pruning techniques should I use to rejuvenate old deciduous shrubs?
6. What is heading back?
7. How does shearing differ from thinning out?

VI. Suggested learning activities and experiences:

1. Review general pruning principles and equipment discussed in Metropolitan Core Curriculum III - Unit L, Problem area: Pruning Evergreens.

2. Show VAS Slidefilm 644 - Pruning Shrubs or other appropriate slide materials.

3. Have a local nurseryperson describe how he or she prunes deciduous shrubs for development and future sales.

4. Identify a plant that needs pruning and have students react as to how it should be pruned, keeping in mind its characteristics, shape, form and intended use.

5. Have students complete Student Worksheet 1 - Pruning Deciduous Shrubs using Cooperative Extension Circular 1033 - Pruning Evergreens and Deciduous Trees and Shrubs as a reference.

6. Demonstrate the proper techniques of pruning deciduous shrubs and hedges. Have students prune actual plant material. Utilize the laboratory exercises included in this problem area for this purpose.

7. Spend a day at a local nursery or arboretum practicing pruning techniques on deciduous shrubs and hedges. Discuss the difference between pruning practices done in the nursery and in the home landscape.

VII. Application procedures:

1. The main purpose of this problem area is to develop skills in the pruning of deciduous shrubs. Skill level for entrance into the job market should be emphasized. On-the-job training should be encouraged.

2. Additional performance should be emphasized in a supervised occupational experience program and work on the home landscape.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate the student worksheet.

3. Evaluate students on actual performance when pruning deciduous shrubs.

IX. References and aids:

The following references were used to complete this problem area:

1. All About Pruning, Ortho Book, Chevron Chemical Company, Ortho Division, 575 Market Street, San Francisco, CA 94105, available at most local garden centers.

2. Crockett, J. U. *Flowering Shrubs*. New York: Time-Life Books, 1972.

3. Giles, F. A., & Sietert, W. B. *Pruning Evergreens and Deciduous Trees and Shrubs* (circular 1033). Urbana-Champaign, IL: Cooperative Extension Service; College of Agriculture, University of Illinois, 1971. A pruning slide set and script are available for use in Illinois in conjunction with this circular. To obtain the slides, contact your local Extension adviser.

4. *Planting and Caring for Hedges* (Horticultural Facts LH 480). Cooperative Extension Service, College of Agriculture, University of Illinois, 61801.

5. *Pruning Landscape Plants* (Bulletin 543). Cooperative Extension Service, College of Agriculture, The Ohio State University, 43210.

6. *Pruning Shade Trees and Repairing Their Injuries* (Home and Garden Bulletin No. 83). U.S. Department of Agriculture, U.S. Government Printing Office, Washington, D.C., 20402.

7. *Pruning Shrubs* (VAS Slidefilm 644). Vocational Agriculture Service, 1401 South Maryland Dr., Urbana, IL 61801.

8. Harshbarger, G. *MacCall's Garden Book*. New York: Simon & Schuster, 1968. Chapter 23, pages 350-368.

INFORMATION SHEET 1

PRUNING DECIDUOUS SHRUBS

REASONS FOR PRUNING DECIDUOUS SHRUBS

* To promote new growth.

* To encourage flowering and fruiting.

* To remove dead, broken, and diseased branches.

* To maintain a desirable size and shape.

PRUNING PRINCIPLES

A. Deciduous Shrubs

* Removal of dead, diseased, or broken wood in early spring is usually the first and most important step in pruning deciduous shrubs. Follow basic pruning techniques of cutting ¼-inch above an outward-facing bud.

* Use renewal techniques to promote new growth, maintain size, and encourage flowering. In the spring cut out the largest branches at the base of the shrub.

* For flowering deciduous shrubs such as forsythia, mockorange, weigela, and lilac, prune immediately after blooming. Cut out and shorten the oldest and weakest branches using heading back or renewal pruning techniques.

* To rejuvenate deciduous shrubs such as viburnum, privet, mockorange, lilac, pieris, and mahonia, prune all stems down to within two to four inches of the ground. Rejuvenation is necessary for plants that have become overgrown and bare at the base. The best time for rejuvenation pruning is in March or April.

* Use heading back techniques for pruning single-stem deciduous shrubs; this involves removing old and/or unwanted stems to a main limb or basic framework limb; make cuts flush with the main stem.

B. Hedges

* During their first season, prune deciduous hedges to a height of four inches from the ground; this drastic pruning will cause two to six stems to sprout for every old one.

* After the first growing season, begin to shape hedges by trimming the top to be more narrow than the base; this practice allows sunlight to reach the lower branches.

* Lightly shear mature formal hedges everytime new growth becomes six inches long.

* Power hedge trimmers work well on young, soft shoots; however, large woody branches may damage the trimmers and result in plant injury.

* Use a line attached to two stakes to mark and guide the cutting height of the deciduous hedge.

STUDENT WORKSHEET 1

PRUNING DECIDUOUS SHRUBS

REFERENCE - Cooperative Extension Circular 1033 - Pruning Evergreens and Deciduous Trees and Shrubs

PLANT	PRUNING TIME	PRUNING METHOD	SPECIAL CONSIDERATIONS
Northern Bayberry	Example: early spring	heading-back or rejuvenation methods	can be severely pruned; recovers rapidly
Japanese Barberry			
Tallhedge Buckthorn			
Rock Cotoneaster			
Redosier Dogwood			
Winged Euonymus			
Scarlet Firethorn			
Forsythia			
American Holly			
Lilac			

STUDENT WORKSHEET 1 (cont'd.)

PRUNING DECIDUOUS SHRUBS

REFERENCE - Cooperative Extension Circular 1033 - Pruning Evergreens and Deciduous Trees and Shrubs

PLANT	PRUNING TIME	PRUNING METHOD	SPECIAL CONSIDERATIONS
Mockorange			
Purpleleaf Plum			
Amur Privet			
Flowering Quince			
Rose of Sharon			
Bridalwreath Spirea			
Doublefile Viburnum			
Koreanspice Viburnum			
Leatherleaf Viburnum			
Weigela			

LABORATORY EXERCISE 1

PRUNING DECIDUOUS SHRUBS

PURPOSE: The purpose of this laboratory exercise is to practice pruning techniques specific to deciduous shrubs.

MATERIALS:

1. Hand pruners
2. Lopping shears
3. Pruning saw
4. Chlorine bleach
5. Different types of deciduous shrubs when available

PROCEDURES:

1. Sterilize the pruner, lopping shear, and saw cutting blades with chlorine bleach.

2. Practice maintenance pruning by removing all dead, diseased, and broken wood.

3. Practice pruning flowering deciduous shrubs such as forsythia and lilac, by cutting stems back to a main limb immediately after flowering.

4. Practice pruning nonflowering deciduous shrubs by thinning out unwanted or old stems. Practice heading back techniques by selecting desirable stems and removing unwanted ones.

5. Practice rejuvenating older shrubs such as lilac, mockorange, and privet, by cutting back all stems to within two to four inches of the ground.

6. Practice safety precautions when using the pruning equipment.

7. Remember to follow basic pruning techniques of cutting to within ¼-inch of an outward-facing bud and making cuts flush with the main stem.

LABORATORY EXERCISE 2

PRUNING DECIDUOUS HEDGES

PURPOSE: The purpose of this laboratory exercise is to practice pruning techniques specific to selected deciduous hedges.

MATERIALS:

1. Hand pruners
2. Lopping shears
3. Electric hedge trimmers
4. Established deciduous hedges when available

PROCEDURES:

1. Sterilize pruner and lopping shear cutting blades with chlorine bleach.
2. Practice initial pruning of deciduous hedges by pruning stems to a height of four inches from the ground.
3. Practice pruning mature deciduous hedges by shaping the top to be more narrow than the base and by removing new growth over six inches long.
4. Use a line attached to stakes to guide and mark the proper cutting height.
5. Use hand pruners and lopping shears for removal of branches. Use electric hedge trimmers to remove new growth and to maintain the desired shape and height.
6. Practice safety precausions when operating electric hedge trimmers. Follow steps outlined in the operator's manual.

TEACHER'S KEY

STUDENT WORKSHEET 1

PRUNING DECIDUOUS SHRUBS

REFERENCE - Cooperative Extension Circular 1033 - Pruning Evergreens and Deciduous Trees and Shrubs

PLANT	PRUNING TIME	PRUNING METHOD	SPECIAL CONSIDERATIONS
Northern Bayberry	early spring	heading back or rejuvenation	can be severely pruned; recovers rapidly
Japanese Barberry	early spring	heading back	used as a hedge; slow growing
Tallhedge Buckthorn	early spring	heading back	fast growing; make as few cuts as possible
Rock Cotoneaster	after flowering	heading back	low, dense, spreading plant
Redosier Dogwood	early spring	renewal and heading back	remove dark stems to ground to preserve red-colored branches
Winged Euonymus	early spring	heading back	slow growing
Scarlet Firethorn	early spring	renewal and heading back	fast growing; tolerates pruning well
Forsythia	after flowering	renewal and rejuvenation	fast growing; tolerates pruning well
American Holly	after flowering	heading back	slow growing; prune lightly
Lilac	after flowering	renewal	tends to get overgrown and untidy with age

STUDENT WORKSHEET 1 (cont'd.)

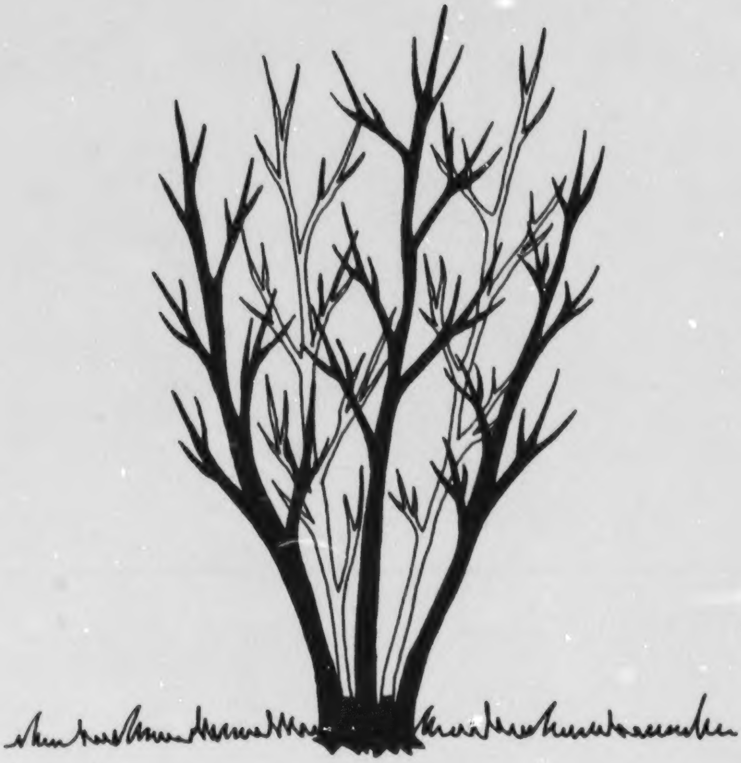
PRUNING DECIDUOUS SHRUBS

REFERENCE - Cooperative Extension Circular 1033 - Pruning Evergreens and Deciduous Trees and Shrubs

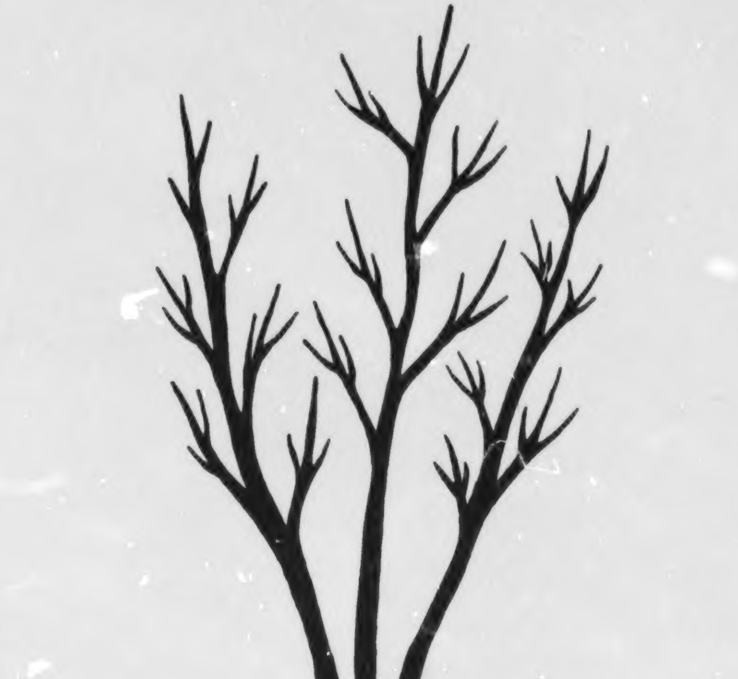
PLANT	PRUNING TIME	PRUNING METHOD	SPECIAL CONSIDERATIONS
Mockorange	after flowering	renewal or rejuvenation	prune 2-year-old wood to ground each year
Purpleleaf Plum	early spring	heading back	fast growing
Amur Privet	early spring	heading back or rejuvenation	tolerates pruning well; fast growing; used as a hedge
Flowering Quince	after flowering	renewal	fast growing
Rose of Sharon	early spring	renewal	unsightly base; keep old wood cut to base
Bridalwreath Spirea	early spring	renewal and heading back	fast growing; shearing top is undesirable
Doublefile Viburnum	after flowering	heading back	prune to a single stem when young
Koreanspice Viburnum	after flowering	renewal and heading back	prune to keep foliage at base of plant
Leatherleaf Viburnum	early summer	renewal and heading back	prune after new growth has matured
Weigela	after flowering	rejuvenation, renewal, and heading back	suffers winter injury; general die-back of stems

RENEWAL PRUNING

BEFORE PRUNING

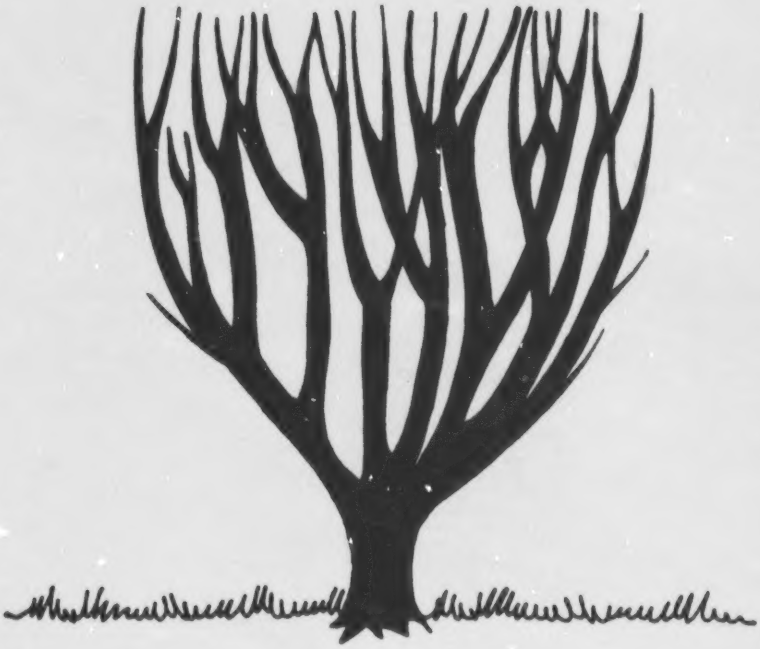


AFTER PRUNING

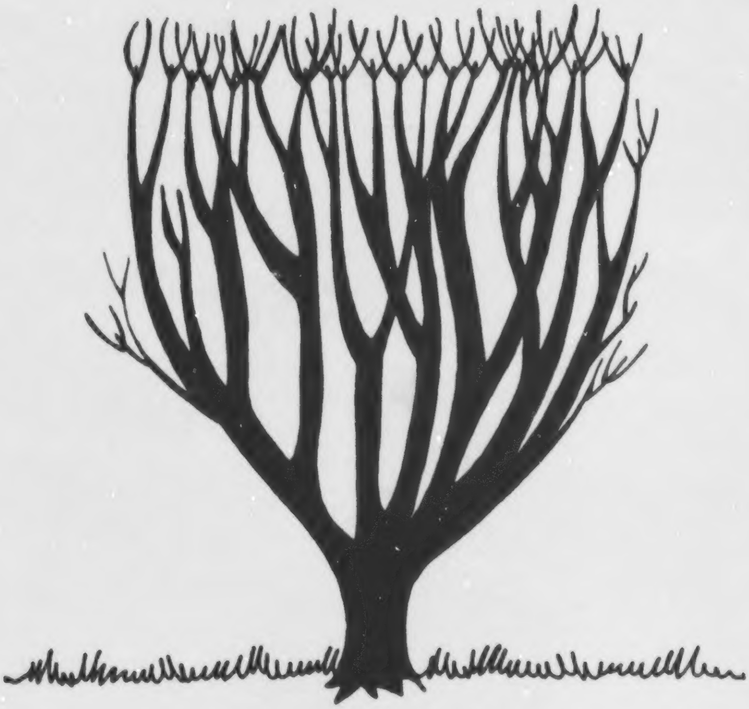


INCORRECT PRUNING TECHNIQUES

SHRUBS SHOULD NOT BE PRUNED WITH HEDGE SHEARS.

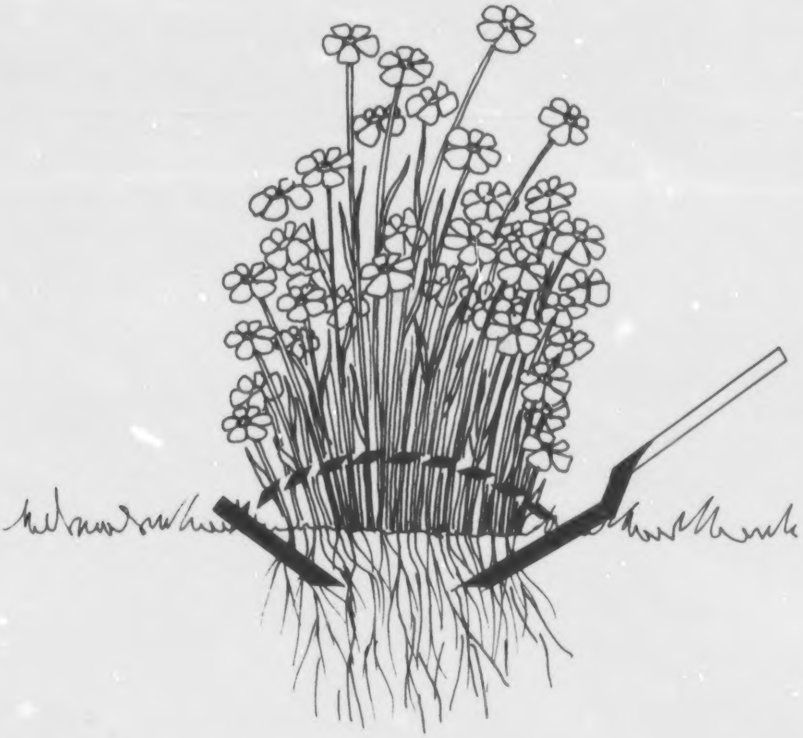


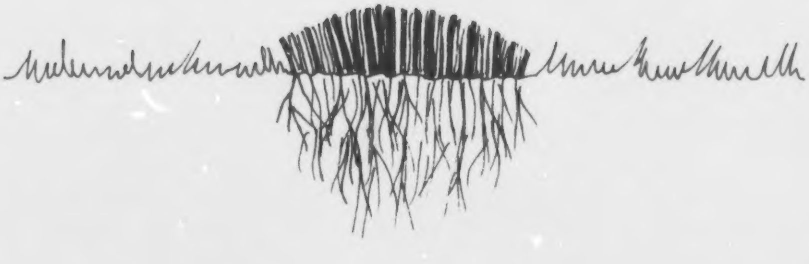
UNDESIRABLE GROWTH RESULTS AFTER SHEARING.



REJUVENATING TECHNIQUES

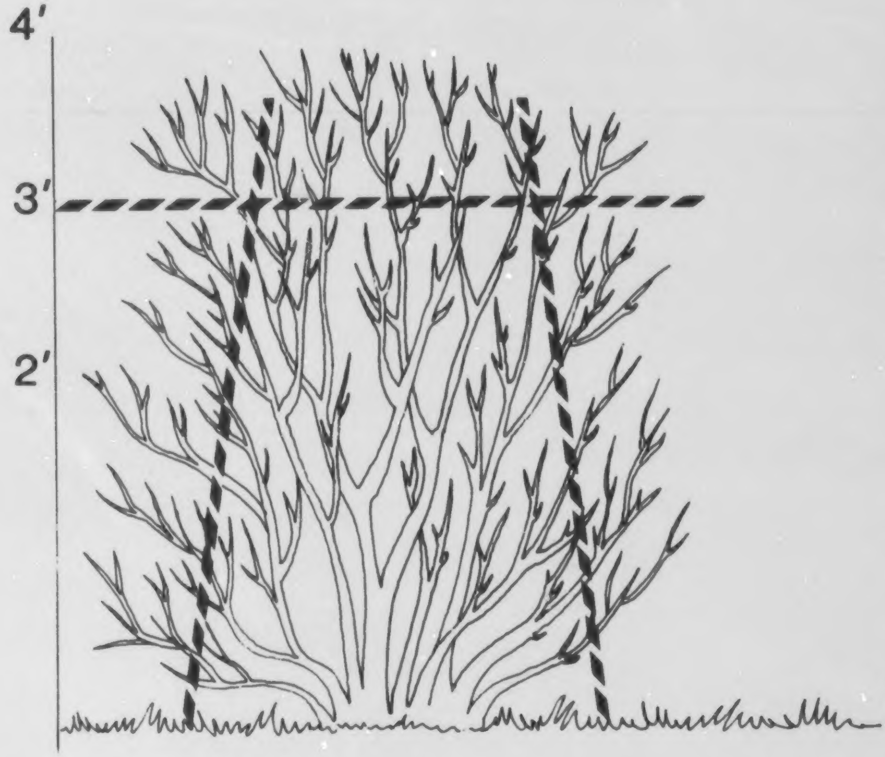
PROPER REJUVENATION TECHNIQUES

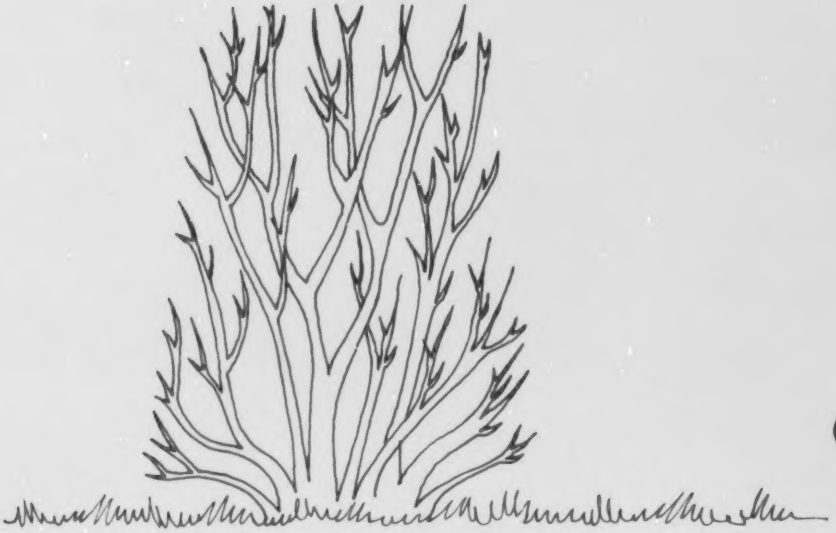




PRUNING DECIDUOUS HEDGES

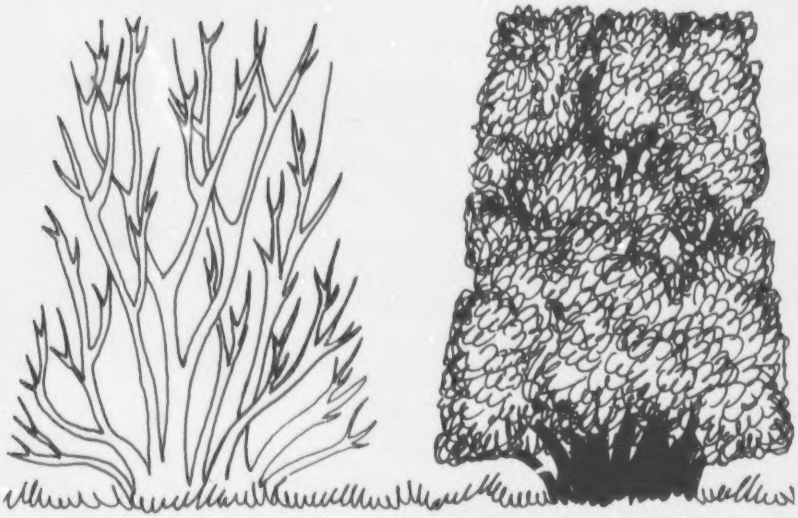
PROPER ANGLE FOR PRUNING



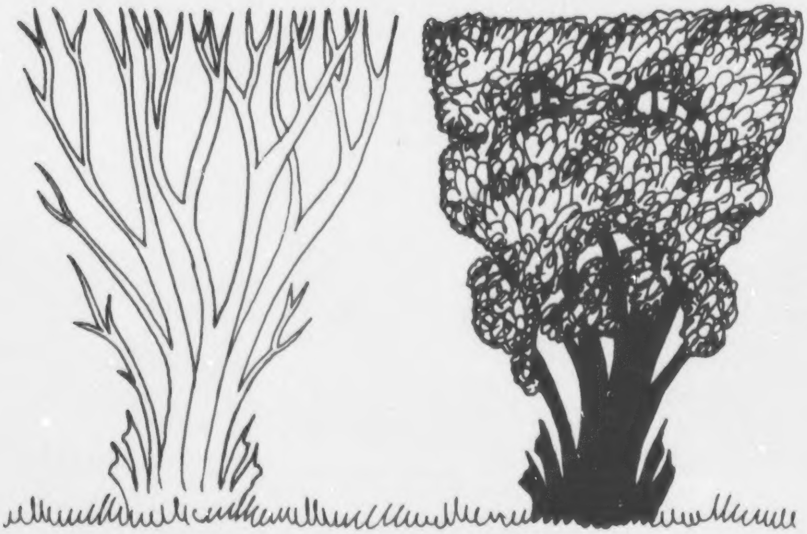


PRUNING TECHNIQUES FOR DECIDUOUS HEDGES

CORRECT PRUNING TECHNIQUE

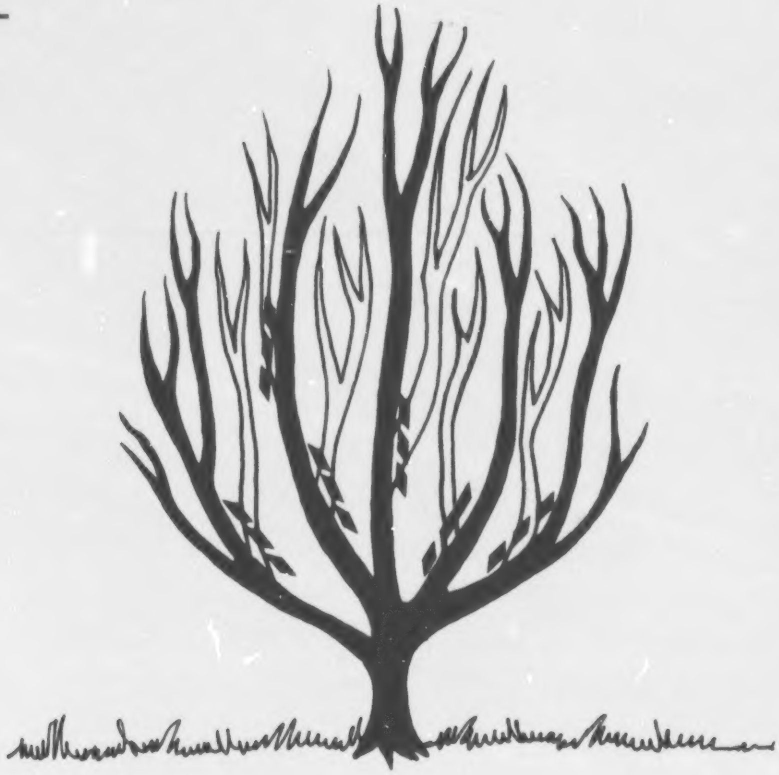


INCORRECT PRUNING TECHNIQUE

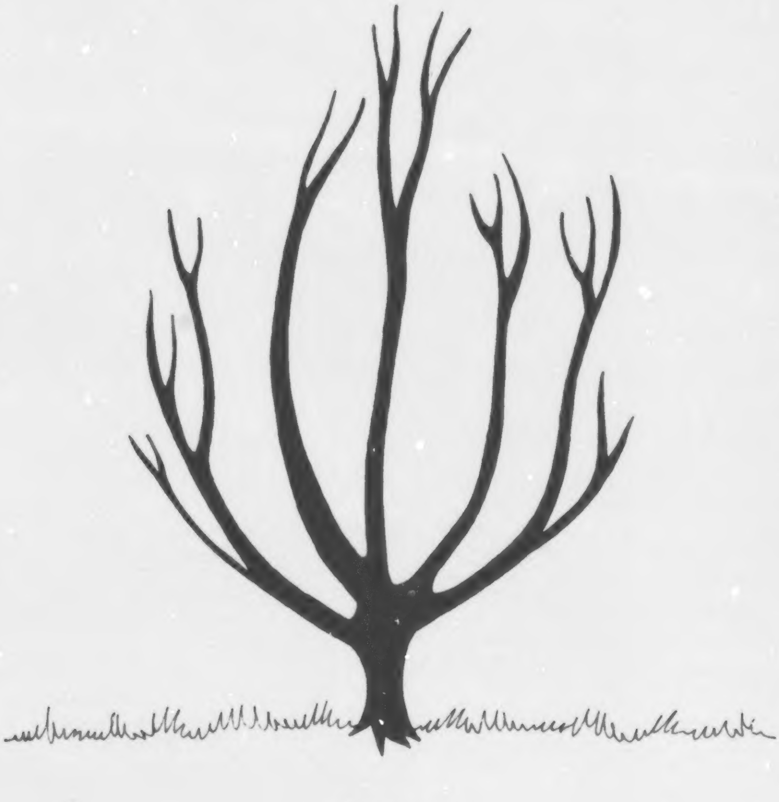


HEADING BACK TECHNIQUES

BEFORE



AFTER



TRANSPARENCY DISCUSSION GUIDE

PRUNING DECIDUOUS SHRUBS

I. Transparency--RENEWAL PRUNING

   A. Each spring cut out the largest stems at the base.

   B. This type of pruning promotes new growth, encourages flowering and fruiting, and maintains a moderate size.

   C. The following plants can be pruned in this manner: Lilac, Deutzia, Kerria, Mockorange, Weigla, Forsythia, Red twig dogwood.

II. Transparency--INCORRECT PRUNING TECHNIQUES

   A. When hedge shears are used to prune deciduous shrubs, each cut sends out many new growing points.

   B. This pruning technique makes the plant dense, encourages small flowers, and causes leaf drop in the interior of the plant.

III. Transparency--REJUVENATING TECHNIQUES

   A. Using a pruning saw, completely cut back all stems to 2- to 4-inch stubs.

   B. The best time for rejuvenating large, overgrown shrubs is in March or April.

   C. The shrub diameter can be reduced by undercutting the base with a sharp shovel.

   D. The following plants flower on new or current year's wood and respond well to rejuvenation: Anthony Waters spirea, Abelia, Honeysuckle, Beauty bush, Privet, Lilac, Mockorange, Viburnum, Pieris, and Mahonia.

IV. Transparency--PRUNING DECIDUOUS HEDGES

   A. The first step in pruning a hedge is to establish lines at the proper angle for cutting.

   B. This angle will allow sufficient light to reach the lower branches.

V. Transparency--PRUNING TECHNIQUES FOR DECIDUOUS HEDGES

   A. To prevent hedges from becoming tall and leggy with very little foliage at the base, have sides angle in toward the top of the plant.

B. Hedges pruned with sides that angle in toward the base will lose foliage near the base of the plant.

VI. Transparency--HEADING BACK TECHNIQUES

A. In the spring remove unwanted or old branches on single-stemmed plants by pruning back to a main limb. Never leave a stub.

B. This technique opens the plant up and reduces its size by removing damaged or unneeded limbs.

C. This pruning technique is similar to renewal, but branches are cut back to the main trunk instead of the ground level.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

PRUNING DECIDUOUS SHRUBS

SHORT ANSWER:

1. List the reasons for pruning deciduous shrubs.

   Pruning is done to promote new growth, to encourage flowering and fruiting, to remove dead, diseased, and broken stems, and to maintain a desirable size and shape.

2. When should most deciduous flowering shrubs be pruned? Why should they be pruned at this time?

   Most deciduous flowering shrubs should be pruned immediately after blooming. If pruned in early spring, flower buds will be removed.

3. Why should deciduous hedges be pruned more narrow at the top than at the base?

   This technique allows sunlight to reach the lower branches and prevents leaf drop from the base of the shrub.

4. What is the rejuvenation pruning technique?

   Rejuvenation of older shrubs is accomplished by cutting all stems to within two to four inches of the ground.

5. Why should deciduous hedges be pruned initially to a height of four inches from the ground?

   This drastic pruning technique encourages two to six new stems to sprout for every old stem resulting in a dense hedge.

TRUE OR FALSE:

False 1. Renewal pruning involves cutting back branches to the main trunk of the shrub.

True 2. Using hedge shears to prune deciduous shrubs results in each cut sending out many new growing points.

False 3. When pruning deciduous hedges, angle the sides to create a broad top and a narrow base.

False 4. Flowering shrubs, such as forsythia and lilac, should be pruned in early spring before they have bloomed.

True 5. Dead, diseased, broken and weak branches can be pruned at any time during the year.

MULTIPLE CHOICE:

1. An example of a deciduous shrub that responds well to rejuvenation pruning is:

   a. azalea.
   b. tallhedge.
   c. taxus.
   *d. privet.

2. When pruning deciduous hedges, angle and shape the plant so that the:

   *a. base is broad and the top is narrow.
   b. base is narrow and the top is broad.
   c. base and the top are both narrow.
   d. base and the top are both broad.

3. Cutting out the largest stems at the base of the deciduous shrub is called:

   a. dehorning.
   b. heading back.
   c. rejuvenation.
   *d. renewal.

4. When removing an entire branch from a deciduous shrub:

   *a. make cuts flush with the main stem.
   b. leave a ¼-inch stub to prevent ripping the bark.
   c. leave a small stub with 1 bud attached to insure continued growth.
   d. leave a 1-inch stub to prevent a large, open wound on the main stem.

5. Cutting back large, overgrown deciduous shrubs to within 2 to 4 inches of the ground is called:

   a. dehorning.
   *b. heading back.
   c. rejuvenation.
   d. renewal.

UNIT L: LANDSCAPE DESIGN, ESTABLISHMENT, AND MAINTENANCE

PROBLEM AREA: PRUNING DECIDUOUS SHADE TREES

SUGGESTIONS TO THE TEACHER:

This problem area is designed to build upon basic pruning skills practiced in Core III and IV. The recommended time for teaching this problem area is during the late winter or early spring months.

The estimated time for this problem area is 3 to 5 days. If the teaching plan is limited to classroom discussion with little or no practical experiences, the instructional time can be less than five days.

The pruning of fruit trees has been covered in Metropolitan Core Curriculum III - Unit G, Problem Area: Growing Fruit Trees. The pruning of evergreens has been covered in Metropolitan Core Curriculum III - Unit L, Problem Area: Pruning Evergreens. The pruning of grape vines and other small fruits has been covered in Metropolitan Core Curriculum III - Unit G, Problem Area: Growing Small Fruits and Brambles. The pruning of deciduous shrubs has been covered in Metropolitan Core Curriculum IV - Unit , Problem Area: Pruning Deciduous Shrubs. Specialized pruning techniques have been covered in Metropolitan Core Curriculum IV - Unit L , Problem Area: Pruning Bonsai, Espalier, Topiary, Vines, and Roses.

CREDIT SOURCES:

These materials were developed through a funding agreement, R-33-24-D-0362-466 with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed, as policy or opinion of the Illinois State Board of Education or its staff.

The teacher's guide, student worksheets, laboratory exercise, transparency guide, and sample test questions were developed by Janet L. Henderson, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Teresa E. Paniello, and Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois.

Transparency masters were prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriulum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Landscape design, establishment, and maintenance

II. Problem area: Pruning deciduous shade trees

III. Objectives: At the close of this problem area, students will be able to:

1. Identify the reasons for pruning deciduous shade trees.
2. Identify the proper techniques for pruning deciduous shade trees.
3. Demonstrate the correct procedures for pruning deciduous shade trees.
4. Demonstrate the correct safety practices when pruning deciduous shade trees.

IV. Suggested interest approaches:

1. Conduct a walking tour of the high school campus to observe proper and improper pruning of deciduous shade trees.
2. Conduct a study trip to a nursery, garden center, or arboretum to observe the pruning of deciduous shade trees.
3. Lead a class discussion on pruning principles by asking the following lead questions:
    a. Who has pruned deciduous shade trees?
    b. Why did you prune the trees?
    c. What tools did you use to prune the trees?

V. Anticipated problems and concerns of students:

1. Why should I prune deciduous shade trees?
2. When should I prune deciduous shade trees?
3. How should I prune deciduous shade trees?
4. What tools should I use to prune deciduous shade trees?
5. How are deciduous shade trees pruned differently from other plant material that has been discussed?

VI. Suggested learning activities and experiences:

1. Review pruning equipment discussed in Metropolitan Core Curriculum III - Unit K, Problem Area: Selecting and Buying Horticultural Tools and Equipment.

2. Review general pruning principles outlined in Metropolitan Core Curriculum III - Unit L, Problem Area: Pruning Evergreens.

3. Show VAS Slidefilm F639 - Major Pruning of Trees. Use VAS Study Guide G639 to review the film.

4. Have students complete Student Worksheet 1- Pruning Deciduous Shade Trees using VAS Subject Matter Unit U5004.

5. Have a nursery, garden center, or landscape maintenance worker explain and demonstrate how he or she prunes deciduous shade trees for development and future growth.

6. Display various types of tree wound dressings. Discuss the advantages and disadvantages of each. Conduct an experiment to compare and contrast the effectiveness of each material.

7. Spend a day at a local orchard observing and/or practicing pruning techniques used on deciduous fruit trees. Compare these pruning techniques with those used for shade trees.

8. Demonstrate the correct procedures for pruning deciduous shade trees. Have students prune actual plant material on the school grounds. Utilize Laboratory Exercise 1 to plan this activity.

9. Invite an arborist or a tree service worker to discuss procedures used to prune large deciduous trees. The local utility company may have personnel suitable for this activity.

10. Discuss career opportunities that require pruning skills. Encourage students to consider entrepreneurship possibilities using specialized pruning skills.

11. Have students conduct an inventory of their home landscape, indicating the locations and types of deciduous shade trees. Have students inspect the trees to determine if pruning is necessary. Use Student Worksheet 2 to plan this activity.

VII. Application procedures:

1. The main purpose of this problem area is to develop skills in pruning deciduous shade trees. Skill level for entrance into grounds maintenance or landscaping positions should be emphasized.

2. Additional performance of pruning skills should be encouraged during SOE and home improvement projects.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate student performance when pruning deciduous shade trees.

IX. References and aids:

1. All About Pruning, Ortho Book, Chevron Chemical Company, Ortho Division, 57 Market Street, San Francisco, CA 94105. This reference is available at most local garden centers.

2. Pruning Evergreens and Deciduous Trees and Shrubs (Extension Circular 1033). Illinois Cooperative Extension Service, College of Agriculture, University of Illinois. A pruning slide set and script are available for use in Illinois in conjunction with this circular. To obtain the slides, contact your local Extension advisor.

3. Pruning Landscape Plants (Bulletin 543). Ohio Cooperative Extension Service, College of Agriculture, the Ohio State University, Columbus, Ohio 43210.

4. Vocational Agriculture Service, College of Agriculture, University of Illinois, 1401 South Maryland Drive, Urbana, IL 61801.

   a. VAS Subject Matter Unit U5004 - Pruning Shade Trees.

   b. VAS Slidefilm F639 - Major Pruning of Trees.

   c. VAS Study Guide G639 - Major Pruning of Trees.

STUDENT WORKSHEET 1

PRUNING DECIDUOUS SHADE TREES

Reference: VAS Subject Matter Unit 5004--Pruning Shade Trees.

1. Define pruning - ____

   ____

2. List three factors to consider when removing branches from a shade tree:

   a. ____

   b. ____

   c. ____

3. Why is it necessary to prune a tree at transplanting time? __________

   ____

   ____

4. What problems do weak or v-shaped crotches and interfering branches cause?

   a. weak or v-shaped crotches - ____________________

      ____

      ____

   b. interfering branches - ____________________

      ____

      ____

5. Describe the thinning-out process for shade trees.

   ____

   ____

   ____

6. Why should excessive thinning-out be avoided?

7. Why should dead twigs and branches be pruned?

8. List four reasons for pruning trees to a specific shape:

   a.

   b.

   c.

   d.

9. Define the term "widow-makers" -

10. At what time of year do pruning scars heal best?

11. Why is early spring a good time to prune many types of shade trees?

12. What trees are best pruned when leaves are on the tree? Why?

13. Why should all pruning tools be disinfected after each cut? ____________

____

____

14. List three examples under each heading:

a. Very easily broken trees - ______________________

____

b. Split easily - ______________________________

____

c. Strong trees - ______________________________

____

d. Trees with thorns - __________________________

____

15. Why is knowing the strength of a tree important? ____________

____

____

16. In what shape should the final pruning cut be made? Why? ____________

____

____

17. Why are three cuts usually made when removing large limbs from shade trees?

____

____

____

18. Describe the three cuts to make when removing large limbs from shade trees.

____

____

____

____

19. What happens when final pruning cuts are made too close to the trunk?

____

____

20. What happens when a stub is left on the tree?

____

____

21. Explain how to safely handle pole pruners and pole saws up in large shade trees.

____

____

____

____

22. Describe special pruning considerations for storm damaged trees.

____

____

____

23. What size tree wounds need a protective dressing? Why? __________

____

____

24. List six characteristics of an effective tree wound dressing.

a. ____

____

b. ____

____

c. ____

____

d. ____

____

e. ____

____

f. ____

____

25. What are some problems with creosote and tar pruning paints? ________

____

____

____

26. When should tree wound dressings be applied? ________________

____

____

STUDENT WORKSHEET 2

DECIDUOUS SHADE TREE INVENTORY

	Name of Tree	Location	Pruning Requirements
Example:			
1.	Red Maple	south side of house by driveway	Remove broken limb; remove 2 lowest branches to prevent pedestrian injury
2.			
3.			
4.			
5.			
6.			
7.			
8.			

LABORATORY EXERCISE 1

PRUNING DECIDUOUS SHADE TREES

PURPOSE:

The purpose of this laboratory exercise is to practice pruning techniques specific to deciduous shade trees.

MATERIALS:

1. Hand pruners
2. Lopping shears
3. Pruning saw
4. Pole pruner
5. Chlorine bleach
6. Different types of deciduous trees

PROCEDURES:

1. Demonstrate the safe and proper handling of the various pruning tools.

2. Sterilize the blades of the pruning equipment with chlorine bleach.

3. Practice maintenance pruning by removing all dead, diseased, and broken wood.

4. Practice thinning-out techniques by cutting branches to lower laterals (a practice called drop-crotching).

5. Use hand pruners on branches up to 3/4" thick. Use lopping shears on branches up to 1 3/4" thick.

6. All cuts should be smooth; do not leave stubs.

7. Practice cutting each branch back to a bud or side limb. Select buds that are pointing to the outside so new growth will not grow through the interior of the tree.

TEACHER'S KEY

STUDENT WORKSHEET 1

PRUNING DECIDUOUS SHADE TREES

Reference: VAS Subject Matter Unit 5004--Pruning Shade Trees.

1. Define pruning - The methodical removal of parts of a plant to improve it in some respect.

2. List three factors to consider when removing branches from a shade tree:

   a. minimum damage to the growing tissue.

   b. the wound must heal properly in the shortest possible time.

   c. the least possibility of infection should be present.

3. Why is it necessary to prune a tree at transplanting time? In order to maintain the proper root-top balance; the root system is disturbed during transplanting.

4. What problems do weak or v-shaped crotches and interfering branches cause?

   a. weak or v-shaped crotches - weak crotches are a major source of storm damage; the narrow angles are weak because tissue are not uniformily united.

   b. interfering branches - these branches rub off the bark of the point of friction leaving an opening for fungus infction and rot.

5. Describe the thinning-out process for shade trees.

   Heavy leaf growth at the tops of branches must be removed to allow better light and circulation

6. Why should excessive thinning-out be avoided?

Excessive thinning increases the danger of sunscald to the interior branches and trunks of thin-barked trees.

7. Why should dead twigs and branches be pruned?

Removing dead twigs and branches helps to control elm bark beetles, which are carriers of the Dutch Elm disease fungus.

8. List four reasons for pruning trees to a specific shape:

   a. to clear utility lines

   b. to allow street lights to functin efficiently

   c. to develop the characteristic form of the tree

   d. to repair storm damage

9. Define the term "widow-makers" - Dead branches are called "widow makers" because they can easily fall in high winds, sleet, or heavy snows.

10. At what time of year do pruning scars heal best?

early spring; February 15 - May 15

11. Why is early spring a good time to prune many types of shade trees?

In the early spring pruning scars heal better, natural gums form to create a barrier to infection, and dead wood can be removed before new diseases develop.

12. What trees are best pruned when leaves are on the tree? Why?

Hard maples, yellowwood, walnuts, and birches are heavy bleeders and should not be pruned in the early spring.

13. Why should all pruning tools be disinfected after each cut? To prevent the spread of disease and decay organisms.

14. List three examples under each heading:

    a. Very easily broken trees - White pine, Willoe, Poplar

    b. Split easily - Ash, Magnolia, Birch

    c. Strong trees - Hackberry, Oak, Sycamore

    d. Trees with thorns - Black Locust, Hawthorn, Osage Orange

15. Why is knowing the strength of a tree important? The strength of a tree is important to know before allowing your weight to rest on the branchs while pruning.

16. In what shape should the final pruning cut be made? Why? The final pruning cut should be elliptical in shape so the wond will heal properly in the least amount of time.

17. Why are three cuts usually made when removing large limbs from shade trees?

    Three cuts are made when removing large limbs to avoid stripping bark on the present limb or trunk, thus creating a large wound.

18. Describe the three cuts to make when removing large limbs from shade trees.

    The first under cut is made about one foot from the final cut; the second cut is made an inch or two beyond the first cut, severing the limb; the final cut is made flush with the trunk.

d. Allow gases and moisture in the wood to escape gradually.

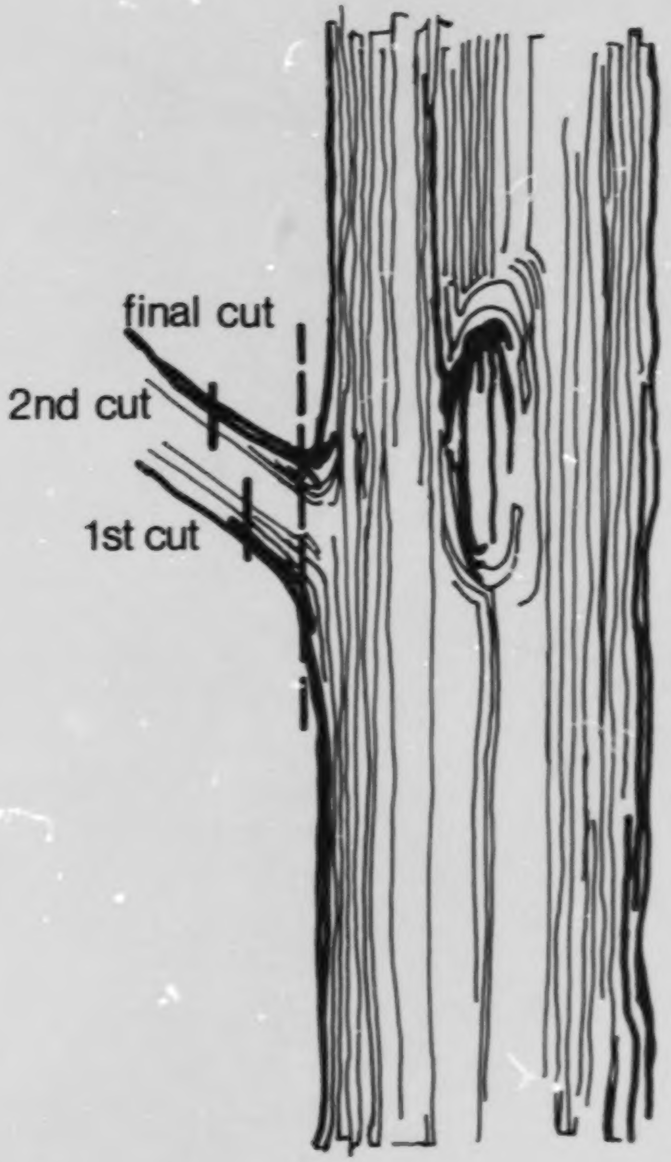
e. Form a semiflexible film which will not crack.

f. Thin enough to allow some penetration beneath the surface of the cut.

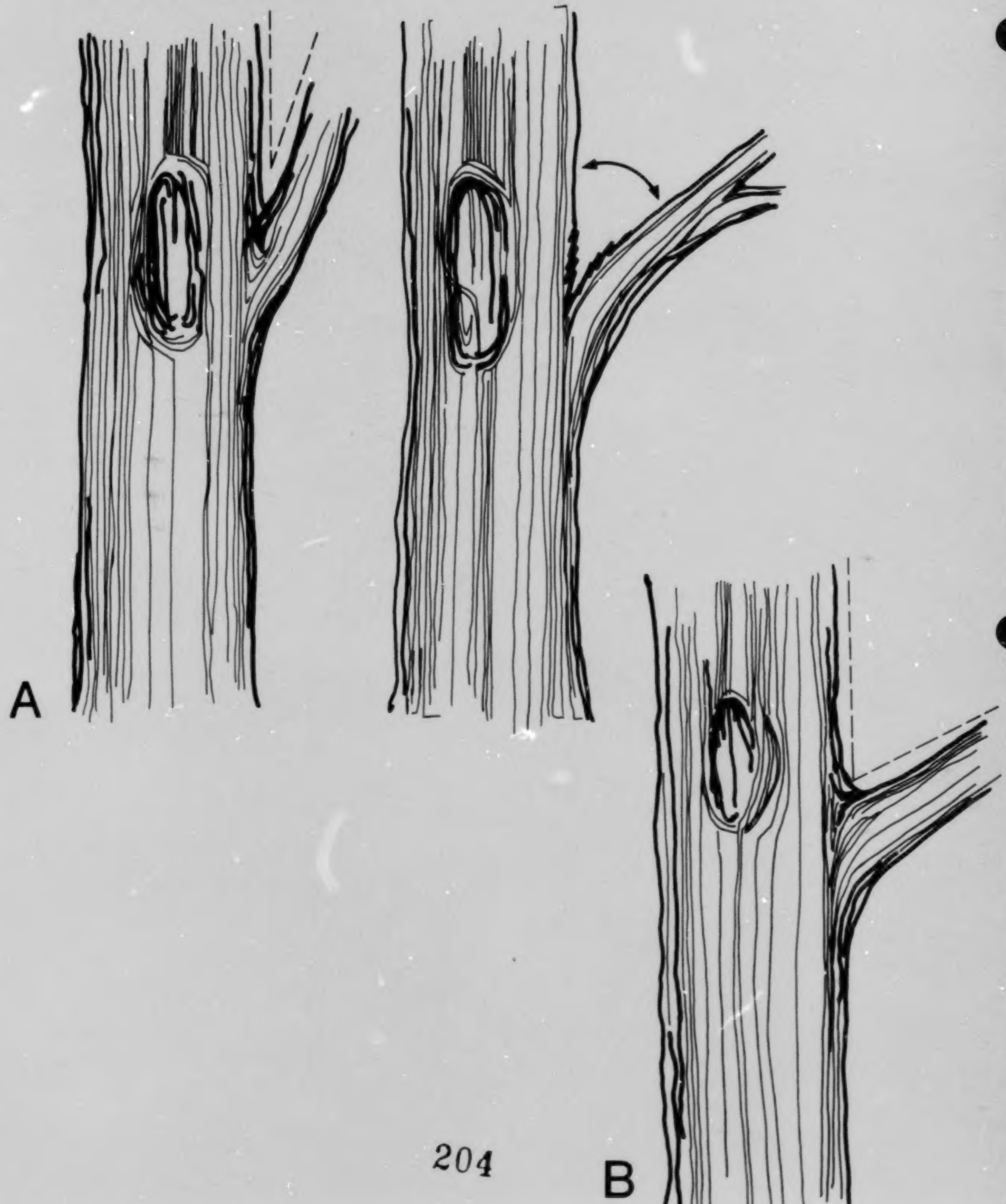
25. What are some problems with creosote and tar pruning paints? Cresote paints tend to kill cambuim tissue at the margin of the wound; tar paints hold excess moisture in the wood and decay is stimulated

26. When should tree wound dressings be applied? Tree wound dressings should be applied as soon as the wound is dry.

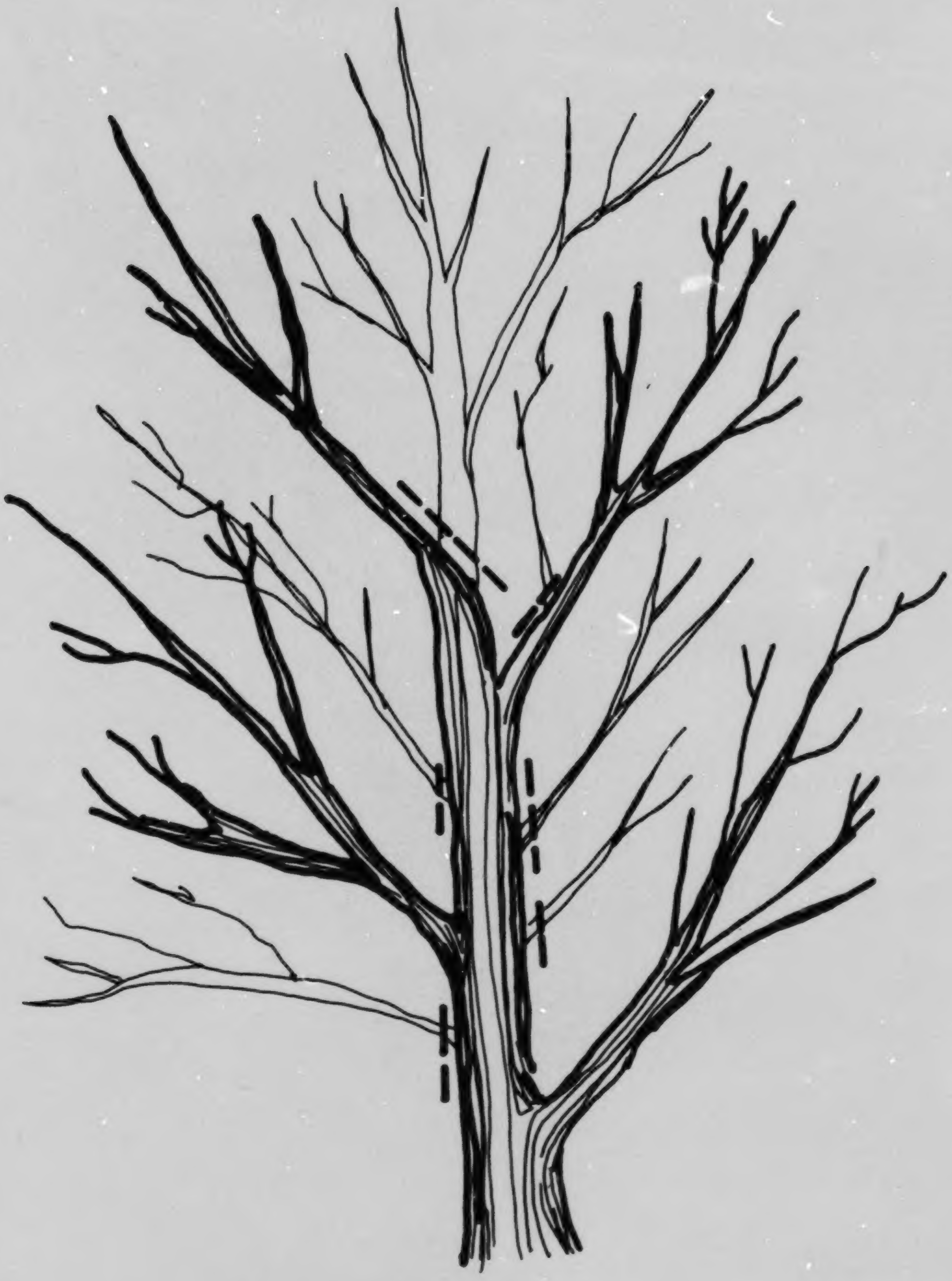
Removing Large Limbs


final cut
2nd cut
1st cut

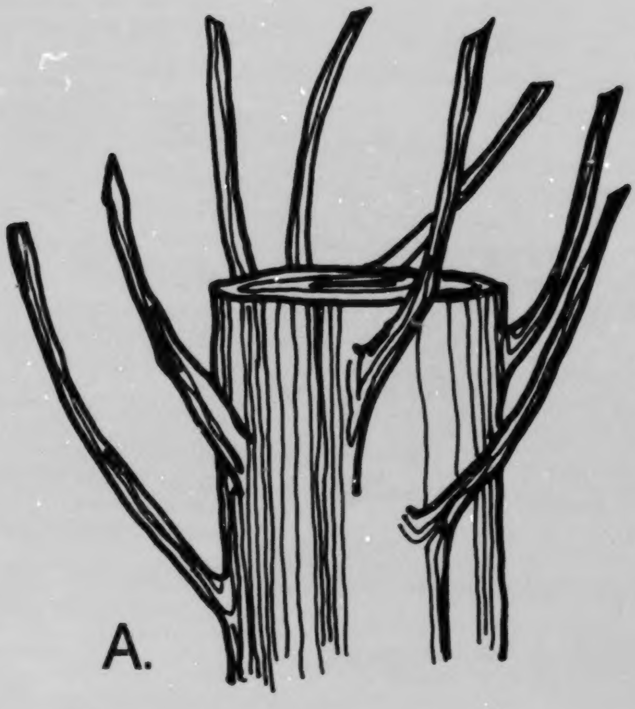
Weak Crotches



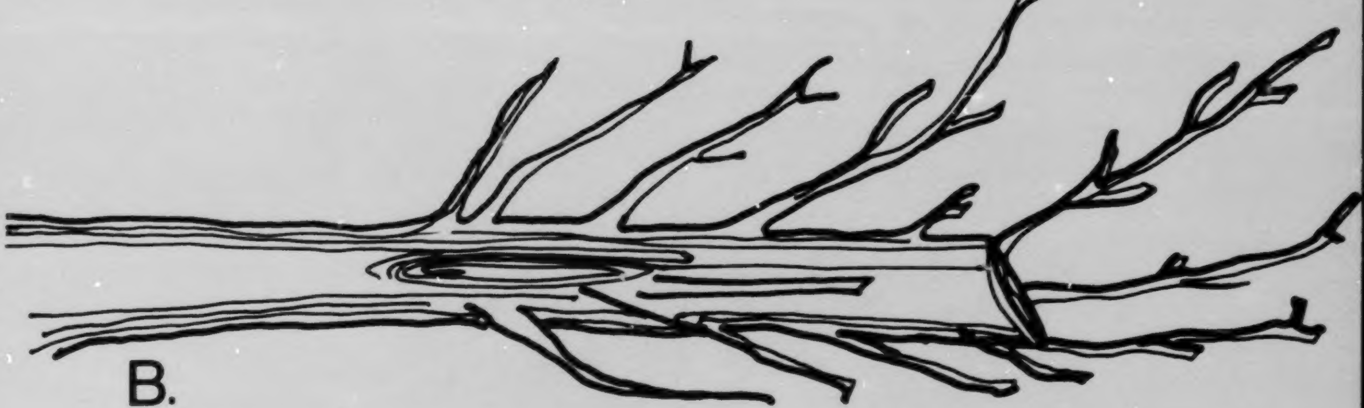
Thinning Out



Topping Trees



A.



B.

TRANSPARENCY DISCUSSION GUIDE

PRUNING DECIDUOUS TREES

I. Transparency--REMOVING LARGE LIMBS

   A. Make an under cut away from the main trunk as illustrated in Figure 1.

   B. Make a top cut in the same area as shown in Figure 2.

   C. Make the final cut flush to the trunk as illustrated in Figure 3.

II. Transparency--WEAK CROTCHES

   A. A branch with a narrow-angle attachment is likely to split and break under heavy loads.

   B. A wide-angle crotch is strong and will bend easily.

III. Transparency--THINNING OUT

   A. Thinning out can be used to control height and help retain the tree's natural shape.

   B. Cut branches to lower lateral limbs.

IV. Transparency--TOPPING TREES

   A. Topping or dehorning encourages the growth of weak, unattractive branches.

   B. Never stub a limb off to reduce its size; this practice will result in many small branches growing at the stub.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

PRUNING DECIDUOUS SHADE TREES

SHORT ANSWER:

1. List 3 reasons for pruning deciduous shade trees.

    a. to remove broken, diseased, or dead wood
    b. to limit the size of the tree
    c. to maintain the natural shape of the tree

2. Why should permanent branches of deciduous shade trees have wide angles of attachment with the trunk?

    Wide-angle crotches are strong and will bend easily; narrow-angle crotches are more likely to split and break.

3. Discuss the differences between thinning out and topping.

    Thinning out techniques reduce density and maintain the natural features of the tree; topping encourages the growth of weak, unattractive watersprouts and gives the tree a deformed look.

4. Why is it necessary to prune a deciduous shade tree at transplanting time?

    To maintain the proper root-top balance, some of the branches will need to be removed.

5. Why should pruning tools be disinfected after each cut?

    To prevent the spread of disease and decay organisms.

TRUE or FALSE:

False 1. Wounds over 1/2" in diameter should be treated with a tree-wound dressing to prevent decay.

False 2. Large branches should be removed by carefully making one cut flush with the trunk.

True 3. Topping or dehorning encourages the growth of watersprouts that are weak and unattractive.

True 4. Hand pruners should be used on branches up to 3/4" thick.

True 5. Pruning cuts should be made flush with the trunk instead of leaving a stub.

True 6. Narrow-angle crotches are a major source of storm damage.

False 7. Pruning scars heal best in the early fall before a heavy frost.

True 8. "Widow-makers" are dead branches that can easily fall in high winds or heavy snows.

False 9. Oak, sycamore, and hackberry are deciduous shade trees that are easily broken.

False 10. The final pruning cut should be square in shape to allow the wound to heal equally on all sides.

UNIT L: LANDSCAPE DESIGN, ESTABLISHMENT, AND MAINTENANCE

PROBLEM AREA: PRUNING BONSAI, ESPALIER, TOPIARY, VINES AND ROSES

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in a vocational agriculture/horticulture program. The recommended time for teaching this problem area is during the late winter or early spring of the year.

The estimated instructional time for this problem area is 10 days, depending on how far the teacher wishes to go in developing specialized pruning skills at the third year level. If the teaching plan is limited to classroom discussion with little or no practical experiences or observations, the instructional time can be less than five days. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area can be adapted by instructors to their local situations.

CREDIT SOURCES:

These materials were developed through a funding agreement, R-33-24-D-0362-466, with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed, as policy or opinion of the Illinois State Board of Education or its staff.

The teacher's guide, information sheets, laboratory exercises, transparency discussion guide, and test questions were developed by Janet L. Henderson, Department of Vocational and Technical Education, University of Illinois and reviewed by Paul E. Hemp, Kallie S. Grobstein, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

The art work in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Landscape design establishment and maintenance

II. Problem area: Pruning bonsai, espalier, topiary, vines and roses

III. Objectives: At the close of this problem area, students will be able to:

1. Define and distinguish between the following horticultural terms: bonsai, espalier, and topiary.
2. List the steps in establishing a bonsai planting.
3. Identify the correct methods for training an espalier plant.
4. List the procedures for developing a topiary plant.
5. Demonstrate the proper pruning techniques to use with:
    a. bonsai
    b. topiary
    c. espalier
    d. roses
    e. vines

IV. Suggested interest approaches:

1. Provide pictures/slides or actual specimens of bonsai, espalier, and topiary plants to generate initial interest and discussion.
2. Conduct a study trip to an arboretum or a conservatory to observe live specimens of bonsai, espalier, and topiary plants.
3. Ask students if they have observed unusual types of plant forms/shapes; discuss how these plants may have been established and maintained.
4. Have students demonstrate practical applications of pruning other plants by using Metropolitan Core Curriculum I - Unit G, Problem Area: Pruning, Pinching, and Disbudding Plants.

V. Anticipated problems and concerns of students:

1. What are bonsai?
2. How do I establish and maintain bonsai plants?
3. What plants are best suited for bonsai?
4. What is an espalier?
5. What are the various espalier designs?
6. How do I establish and maintain espalier plants?

7. What plants are best adapted to espalier training?

8. What is topiary?

9. How do I establish and maintain topiary plants?

10. What plants are best adapted to topiary pruning?

11. Why should I prune roses and vines?

12. How do I prune roses and vines?

13. When should I prune roses and vines.

VI. Suggested learning activities and experiences:

1. Review general pruning techniques covered in Metropolitan Core Curriculum III - Unit L, Problem Area: Pruning Evergreens.

2. Conduct a study trip to an arboretum or a conservatory to observe live specimens of bonsai, espalier, and topiary plants.

3. Demonstrate the proper techniques for pruning vines. Have students prune actual plant material available on the school grounds.

4. Have a local nursery person or landscaper demonstrate how he or she establishes and maintains espalier and topiary plant material.

5. Have students select a container and suitable plant and prepare a bonsai planting following the steps outlined on the information sheets and laboratory exercise.

6. Have students prepare a topiary planting following the steps outlined on the laboratory exercise.

7. Have students design, plant, and maintain a landscape area that includes topiary and espalier plantings and roses and vines. The area can provide plant material for continued practice of specialized pruning techniques.

8. Show movie, Bonsai - The Art of Training Dwarfed Potted Trees. Available from the University of Illinois Film Service.

9. Have students establish and maintain an espalier planting following the steps outlined on the laboratory exercise.

10. Have students practice pruning hybrid tea roses by following the procedures outlined in Metropolitan Core Curriculum I - Unit G, Problem Area: Pruning, Pinching, and Disbudding Plants.

VII. Application procedures:

1. The main purpose of this problem area is to develop skills in the pruning of roses, vines, and bonsai, topiary, and espalier plant material. On-the-job training should be encouraged.

2. Performance should be emphasized in a supervised occupational experience program and work in the home landscape.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate students on actual performance when pruning roses, vines, and bonsai, topiary, and espalier plant material.

IX. References and aids:

The following references were used to complete this problem area:

1. All About Pruning, Ortho Book, Chevron Chemical Company, Ortho Division, 575 Market Street, San Francisco, CA 94105, Available at most local garden centers.

2. Harshbarger, G. F. McCall's Garden Book. New York: Simon and Schuster, 1967.

3. Bonsai: The Art of Training Dwarfed Potted Trees 21-minute film available from the University of Illinois Film Center, 1325 South Oak St., Champaign, IL 61820. In Illinois call toll free (1-800-252-1357).

4. Reader's Digest Illustrated Guide to Gardening. Calkins, C. C. (ed.). The Reader's Digets Association, Inc., 1978.

INFORMATION SHEET 1

PRUNING BONSAI PLANTINGS

DEFINITION OF BONSAI - Bonsai are living works of art consisting of trees and shrubs artificially planted in small containers to reproduce in miniature, landscapes found in nature. Plants are trained to acquire and display characteristics of mature plants while remaining small.

REASON FOR PRUNING BONSAI PLANTINGS

* Reduce size of branches
* Change branch direction
* Thin out dense growth that hides trunk and roots
* Remove dead and diseased parts
* Hold plant within bounds of container
* Maintain balance between top of plant and roots

PRUNING TECHNIQUES FOR BONSAI PLANTINGS

* Do not prune a completely dormant or recently transplanted bonsai
* Prune crossing branches to reveal main structure of the bonsai
* Prune 1/3 of thick roots and 1/3 of tip roots during intitial planting or transplanting
* Constantly pinch back soft tip growths to control density and growth
* Prune flower buds for artistic placement and to prevent death of the plant from overbearing.

RECOMMENDED MATERIALS FOR BONSAI PLANTINGS

FOR BEGINNERS

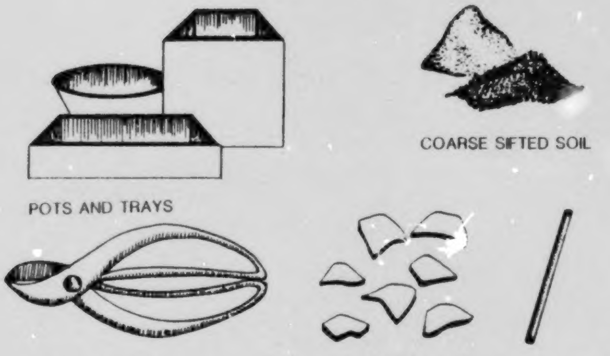
* Jade plant
* Rosemary (herb)
* Azalea
* Juniper species

FOR ADVANCED STUDENTS

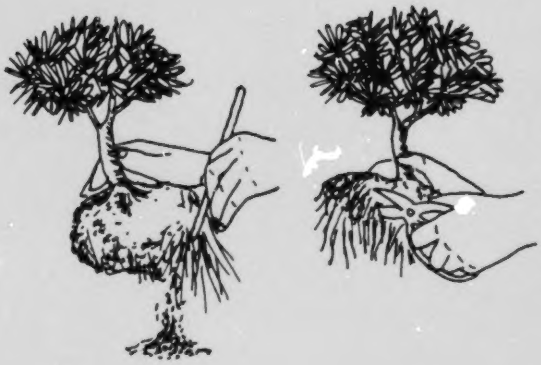
* Flowering Quince
* Japanese maple
* Norway spruce
* Firethorn

INFORMATION SHEET 2

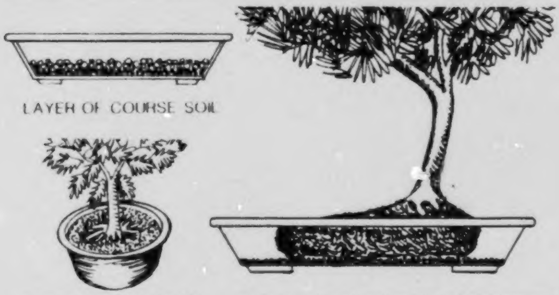
HOW TO POT A BONSAI


POTS AND TRAYS
COARSE SIFTED SOIL
PRUNING SHEARS
BROKEN CROCKS
POTTING STICK

1. COLLECT THE NECESSARY TOOLS AND MATERALS FOR POTTING.



2. REMOVE 1/3 OF THE SOIL BALL AND PRUNE 1/3 OF THE THICK ROOTS

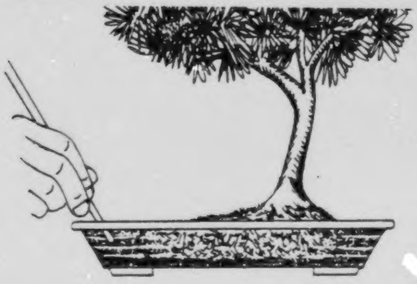


LAYER OF COURSE SOIL

CENTER IN ROUND OR SQUARE POTS

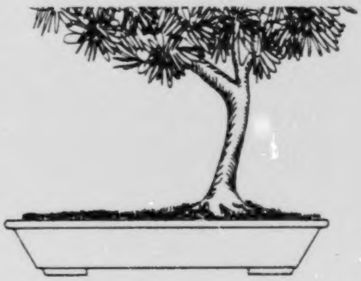
2/3 THE DISTACE FROM EITHER END OF OVAL OR OBLONG TRAY

3. PROVIDE PROPER DRAINAGE AND PLACEMENT IN THE CONTAINER.

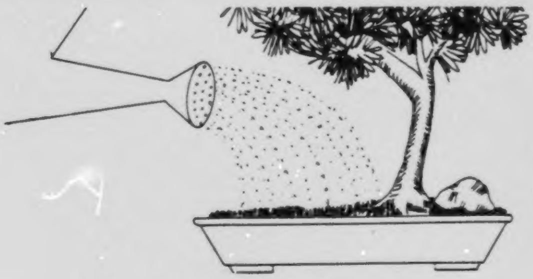


LAYERS OF SIFTED SOIL FIRMED WITH STICK

4. REMOVE AIR POCKETS BY FIRMING THE ROOTING MEDIA.



ADD STONE OR MULCH WITH PEBBLES.FINISH TOP WITH FINEST SOIL AND GREEN MOSS.



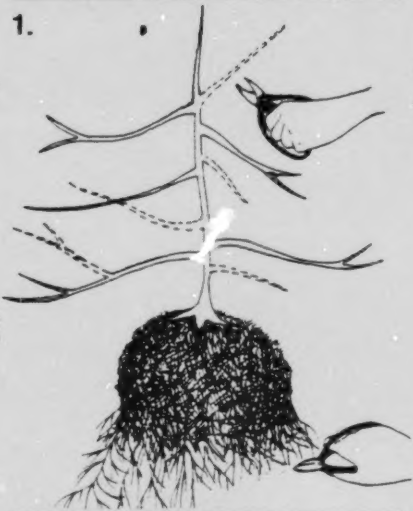
PLACE IN SHELTERED SPOT OR LATH HOUSE. WATER THROUGHLY WITH FINE SPRAY

5. FINISH WITH A FINE STONE OR PEBBLE MULCH.COVER ROOTING MEDIA WITH MOSS.

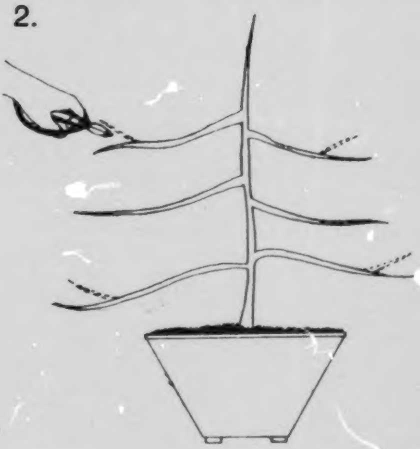
HOW TO PRUNE BONSAI

1. PRUNE EXCESS ROOTS AND BRANCHES TO ROUGHLY SHAPE PLANT AND BALANCE TOP GROWTH WITH ROOTS.
2. PRUNE REMAINING BRANCHES TO CHANGE DIRECTION OF GROWTH AND REDUCE SIZE OF THE PLANT.
3. THIN MATTED CROSSING TWIGS AND BRANCHES TO REVEAL MAIN STRUCTURE OF BONSAI.
4. CONSTANTLY PINCH BACK TO CONTROL GROWTH AND DENSITY.
5. PRUNE, THIN, OR DEFOLIATE IN SUMMER TO CONTROL SIZE OF PLANT AND LEAVES NEEDLES ARE THINNED OR CUT SHORTER.
6. THIN FLOWER BUDS FOR ARTISTIC PLACEMENT AND TO PREVENT DEATH OF PLANTS FROM OVERBEARING.

1.



2.



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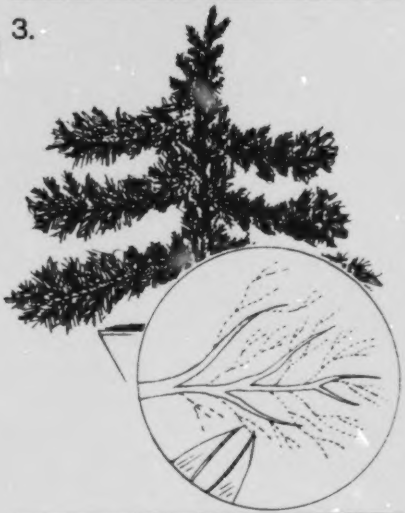

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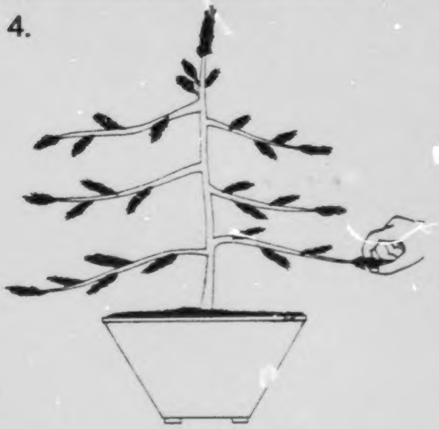

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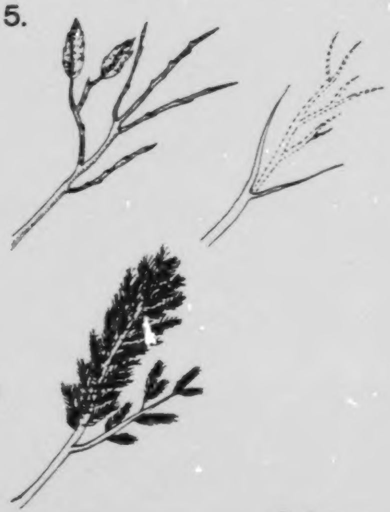

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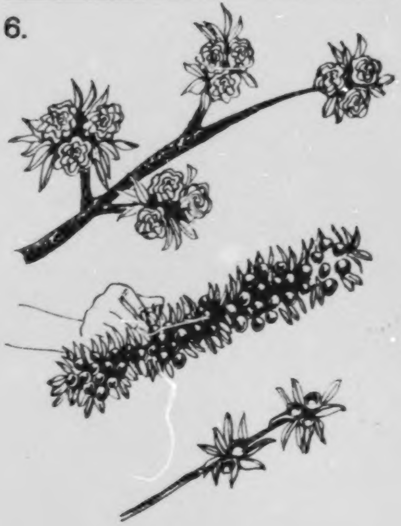
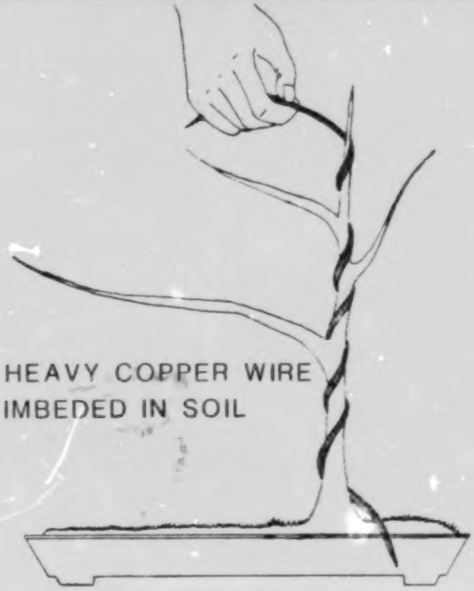
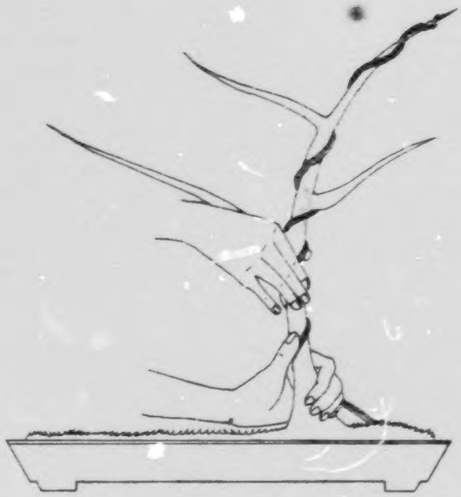


INFORMATION SHEET 4

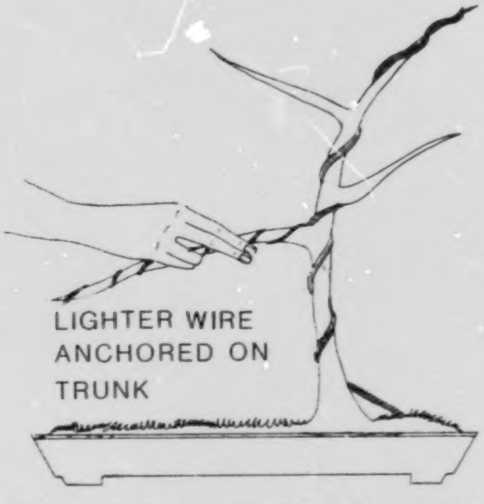
HOW TO WIRE AND SHAPE A BONSAI


HEAVY COPPER WIRE
IMBEDED IN SOIL

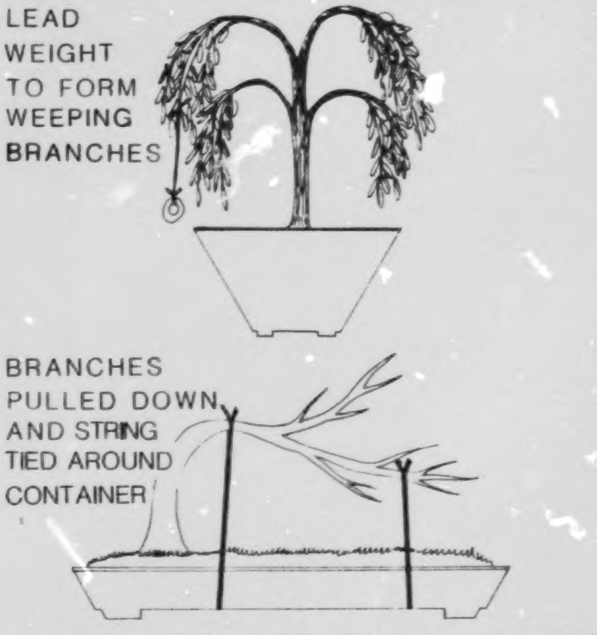
1. BEND A BONSAI BRANCH OR STEM BY WINDING A WIRE AROUND IT SPIRALLY.



2. HOLD THE WIRED PART WITH BOTH HANDS, SLOWLY AND GENTLY FORCE IT INTO THE DESIRED POSITION.


LIGHTER WIRE
ANCHORED ON
TRUNK

3. AFTER SIX MONTHS OR A YEAR , THE WIRE MUST BE REMOVED CAREFULLY OR IT WILL GIRDLE AND SPOIL THE PLANT.


LEAD
WEIGHT
TO FORM
WEEPING
BRANCHES
BRANCHES
PULLED DOWN
AND STRING
TIED AROUND
CONTAINER

4. VERY SMALL OR FRAGILE PLANTS ARE SHAPED BY HANGING WEIGHTS OR TYING THE BRANCHES TO THE CONTAINER

INFORMATION SHEET 5

PRUNING TOPIARY PLANTS

DEFINITION OF TOPIARY - Topiary is a practice used in formal gardens or settings in which plant material is trimmed and trained in the shape of birds, animals, or various geometric shapes.

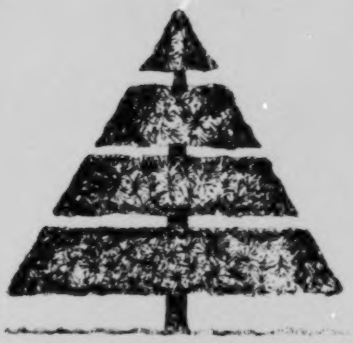
PRUNING TECHNIQUES FOR TOPIARY PLANTS

* Begin trimming and shaping when plant is small to force branching and to create a strong trunk
* Use stiff wire and ties to shape and train plant material into unusual shapes
* Select plants that can withstand continuous clipping and that have small leaves and a dense growth habit
* Prune weekly to keep plant specimen trim and neat

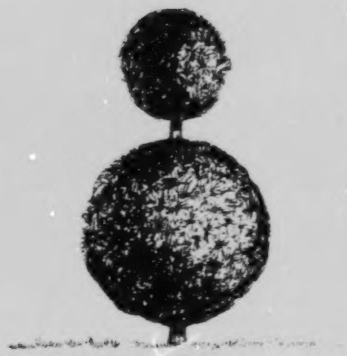
RECOMMENDED PLANTS FOR TOPIARY

* Taxus
* Boxwood
* Canadian Hemlock
* Juniper
* Privet
* Euonymous
* Lavender (herb)

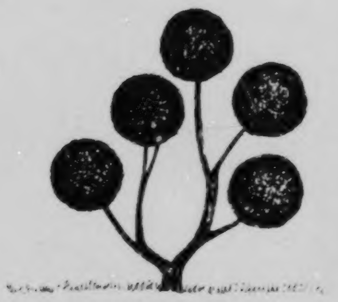
TOPIARY DESIGNS



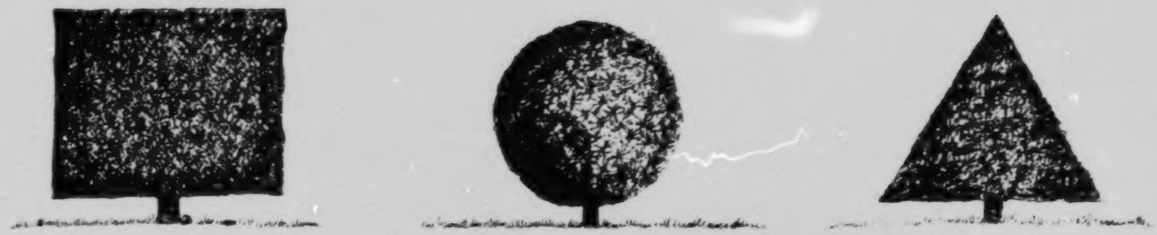
TRADITIONAL
INTERRUPTED CONE



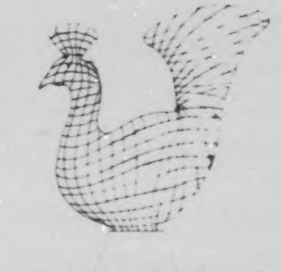
TRADITIONAL
TWO-DECKERS



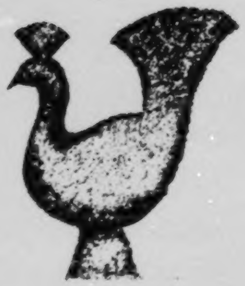
ASYMETRICAL
POM-POM SHAPE



VARIOUS GEOMETRIC SHAPES



PEACOCK
WIRE-FRAME



INFORMATION SHEET 7

PRUNING ESPALIER PLANTINGS

DEFINITION OF ESPALIER - An espalier is a tree or shrub trained to create a two-dimensional effect either against a wall or a wire/wood trellis. The term also can describe the technique of training plants to a flat plane.

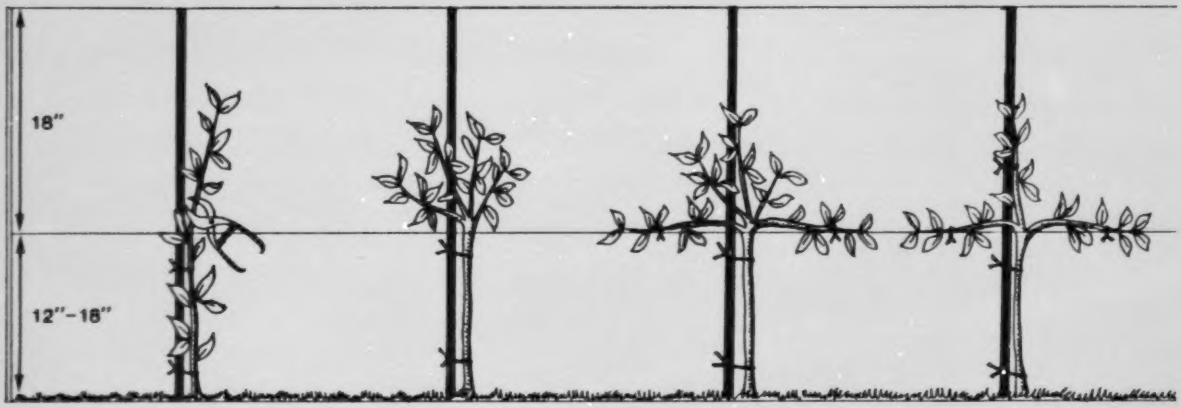
USES FOR ESPALIER

- Conserve space
- Cover up bare walls or exposed foundations
- Focal point in landscape
- Provide background plantings and privacy screens

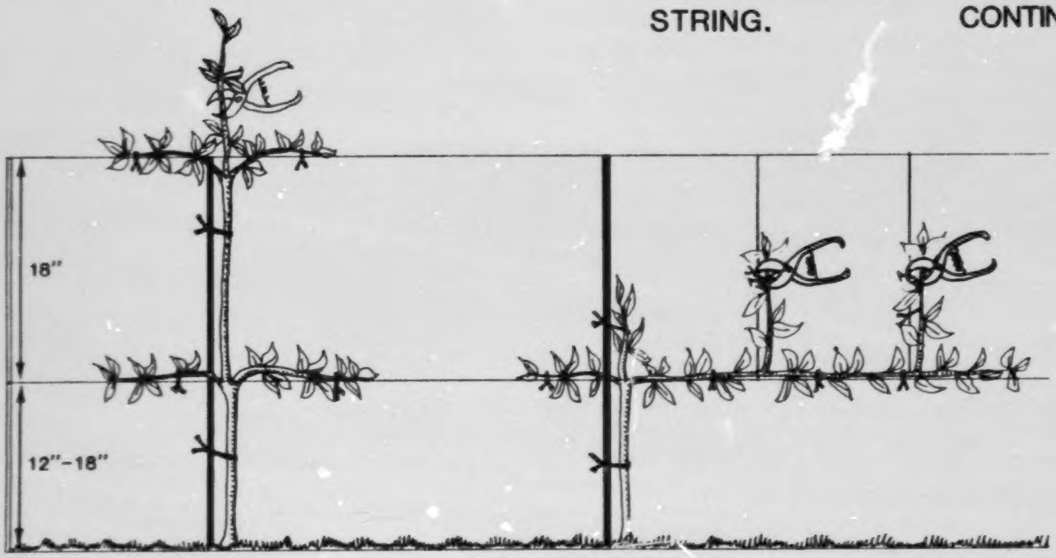
RECOMMENDED PLANTS FOR ESPALIER

- Crabapple
- Pear
- Peach
- Forsythia
- Star or Saucer Magnolia
- Firethorn
- Juniper Species
- Cotoneaster
- Viburnum
- Flowering Quince

BASIC PRUNING STEPS FOR ESPALIER TRAINING



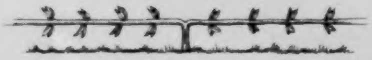
1. CUT 2" ABOVE FIRST WIRE.
2. WAIT FOR NEW SHOOTS.
3. TRAIN TWO BEST SHOOTS ON BOTTOM WIRE; PRUNE EXCESS; TIE WITH SOFT STRING.
4. ALLOW ONE CENTER SHOOT AND TWO HORIZONTAL SHOOTS TO CONTINUE.



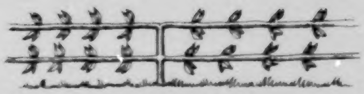
5. START SECOND WIRE 12 TO 18 INCHES ABOVE FIRST BUD; CUT OFF CENTRAL LEADER IN SPRING.
6. VERTICALS MAY BE TRAINED FROM HORIZONTALS TO CREATE THE GRID IRON PATTERN.
7. PRUNE TO THREE LEAVES FROM HORIZONTAL IN MIDSUMMER TO MAINTAIN GROWTH.

ESPALIER PATTERNS

HORIZONTAL ESPALIERS

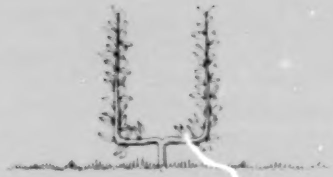


SINGLE

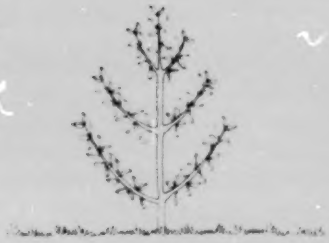


DOUBLE

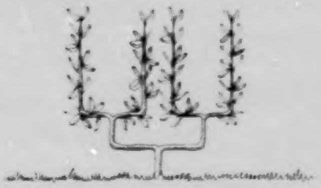
VERTICAL ESPALIERS



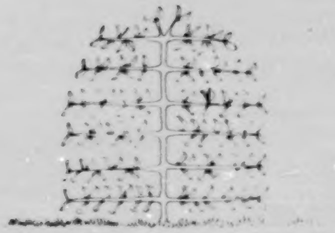
U-SHAPED



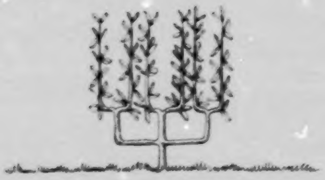
PALMETTE OBLIQUE



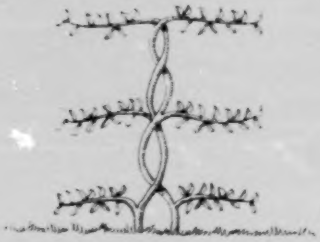
DOUBLE U-SHAPED



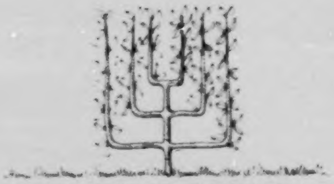
HORIZONTAL-T



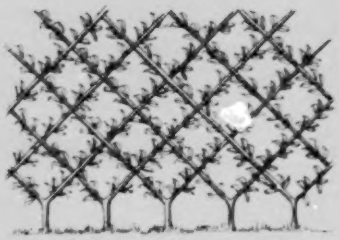
TRIPLE U-SHAPED



BRAIDED TREES

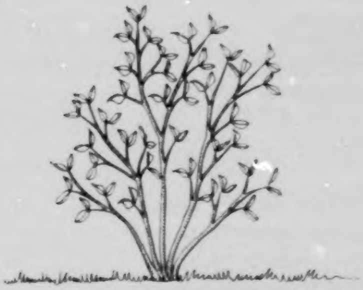


PALMETTE VERRIER

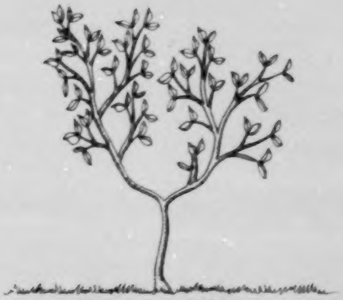


BELGIAN FENCE

INFORMAL ESPALIERS



INFORMAL FAN



FREE-FORM

INFORMATION SHEET 10

PRUNING ROSES

TYPES OF ROSES - Roses are divided into 2 main categories by their growth habit - bush roses and climing roses.

Full-grown bush roses are 1 to 6 feet high and require no support. Hybrid tea, floribunda, and grandiflora are examples of bush roses. Hybrid tea roses have one flower bud per stem, bloom intermittently, and have double flowers. Floribunda roses have flowers borne in clusters, bloom continuously, and have single, semi-double, or double flowers. Grandiflora roses have several flowers to one stem, bloom continuously, and have an appearance between hybrid tea and floribunda flowers. Bush roses flower on new or current season's wood.

Climbing roses produce long canes and must be supported. Climbing roses are everblooming and may have large blooms similar to hybrid teas or clustered flowers like the floribundas. Climbing roses flower on old or previous year's wood.

BASIC PRUNING STEPS - All roses require 3 basic pruning steps. These include:

a. cutting back all dead and diseased wood to an outward-facing bud.

b. cutting back all weak or thin canes.

c. cutting out stems that cross or rub each other.

When making pruning cuts, cut ¼ inch above an outward facing bud and make cuts slant back and away from the bud.

PRUNING BUSH ROSES

Late Winter

* Best time to prune bush roses is at the end of the dormant season when danger of a hard frost has passed.

* Follow basic pruning steps to remove dead, diseased, weak, or crossing stems.

* Cut to 1 inch below the dark-colored areas on the canes; if no live buds are left, remove the entire cane.

* Shape the plant by cutting the strong canes to a uniform height (12 to 18 inches)

* To produce large flowers for exhibition, prune hard to 3 buds above the base in the late winter

Summer

- * Remove all stems and suckers that emerge below the graft union; make cuts flush with the main stem
- * For hybrid teas and grandifloras, cut faded blooms to a point just above an outward-facing bud; this practice will encourage a second flowering and prevent overcrowding.
- * For floribundas, remove the entire flower cluster to the first leaf bud

PRUNING CLIMBING ROSES

Late Winter

- * Follow basic pruning steps to remove dead, weak or diseased canes.
- * Remove old canes to shape plant and prevent overcrowding.
- * Prune sparingly since removal of too much wood at this time will reduce production of flowers.

Summer

- * Cut back strong, vigorous stems to within 2 or 3 buds of the main cane as soon as flowers fade.
- * Do not let seed pods form because they deprive the plant of needed energy.

INFORMATION SHEET 11

PRUNING VINES

CHARACTERISTICS OF VINES - Vines are plants that have flexible stems and climbing growth habits. Some vines, such as English and Boston ivies, Virginia creeper, and creeping fig, can fasten themselves to walls and supports by twining tendrils, rootlets, or clinging disks.

Other vines, such as clematis, wisteria, trumpet creeper, and honeysuckle need the support of a trellis or horizontal wire. Soft string, strips of cloth, and twist ties can be used to tie vines to a support. Bare wire should not be used to prevent injury to the stem.

Vines take up little ground space and can be an atrractive part of the landscape.

PRUNING TECHNIQUES FOR VINES

* Most vines should be left unpruned until they get too large for the provided space and create an untidy tangle of shoots.

* Flowering vines (clematis, honeysuckle, wisteria, trumpet creeper) should be pruned after blooming; cut shoots back to where new growth is developing to maintain the desired shape.

* Vines that are grown for their foliage (ivies, Virginia creeper, creeping fig) may be pruned throughout the growing season to restrict growth and keep the plants in bounds.

* To reduce the size of vines and encourage new growth, remove main stems that are old and woody or cut back to vigorous growing shoots near the base of the stem; this type of pruning should be done in late winter when danger of a hard frost has passed.

LABORATORY EXERCISE 1

ESTABLISHING AND MAINTAINING A BONSAI PLANTING

PURPOSE: The purpose of this laboratory exercise is to establish and maintain a bonsai planting.

MATERIALS:

1. Suitable containers with drainage holes
2. Rooting media and gravel
3. Small sharp sticks
4. Hand pruners
5. Potted plants (to be trained to bonsai)

PROCEDURES:

1. Remove 1/3 of the soil ball of the selected plant and prune 1/3 of the thick roots prior to planting.

2. Prune excess top growth to balance with roots.

3. Select a shallow, flat container with drainage holes.

4. Cover drainage holes with gravel.

5. Fill container ½ full with coarse, loose sifted soil.

6. Place plant off-center in an oblong container or in the center of a round or square container.

7. Firm the rooting media with a small sharp stick to settle the media and remove air pockets.

8. Prune remaining branches to shape and reduce the size of the plant.

9. Add soil within ½ inch of the top of the container.

10. Add a layer of fine soil, pebbles, or green moss.

11. Water thoroughly with a fine spray.

12. Place in a sheltered and shaded spot.

13. Continue to pinch, thin, or defoliate new growth throughout the growing season.

14. Use wire to train the bonsai into the desired shape.

LABORATORY EXERCISE 2

ESTABLISHING AND MAINTAINING A TOPIARY PLANT

PURPOSE: The purpose of this laboratory exercise is to establish and maintain a topiary plant using a wire frame for support.

MATERIALS:

1. 9- to 20-gauge wire
2. Suitable containers
3. Loose soil
4. Small rooted cuttings of English ivy

PROCEDURES:

1. Bend the 9- to 20-gauge wire into a desired shape (Examples: a heart, triangle, or circle).

2. Firmly secure wire form in the selected container.

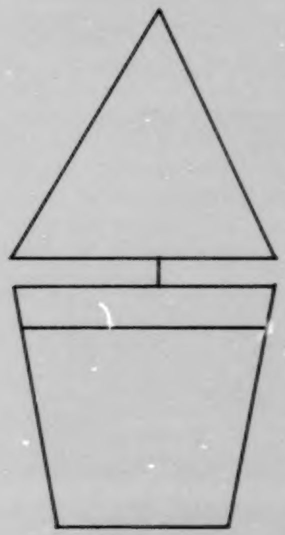
3. Fill container with loose soil.

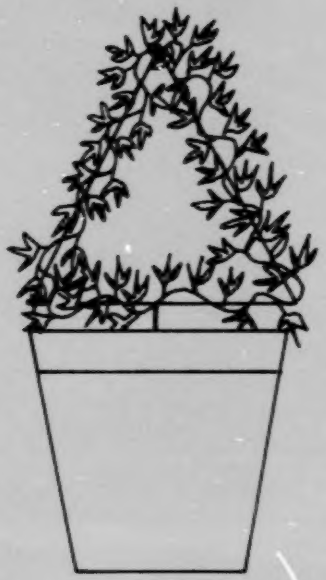
4. Place rooted cutting at the base of the wire form.

5. As the cuttings grow, train to the wire form by pruning excess growth.

6. Secure the stem to the wire form with flexible plant ties.

7. Use the following illustrations to guide your work:





LABORATORY EXERCISE 3

ESTABLISHING AND MAINTAINING AN ESPALIER PLANTING

PURPOSE: The purpose of this laboratory exercise is to establish and maintain an espalier planting on the school grounds.

MATERIALS:

1. Hand pruners
2. Chlorine bleach
3. Appropriate plant material (i.e., fruit trees, dogwood, magnolia)
4. Four foot (4') trellis for training purposes.

PROCEDURES:

1. Sterilize the pruner cutting blade with chlorine bleach.

2. Prune back the selected plant to within 2" of the height of the first wire (12"-18").

3. Wait for new shoots.

4. Horizontally train the 2 best shoots on the bottom wire and allow one center shoot to continue.

5. Prune excess shoots.

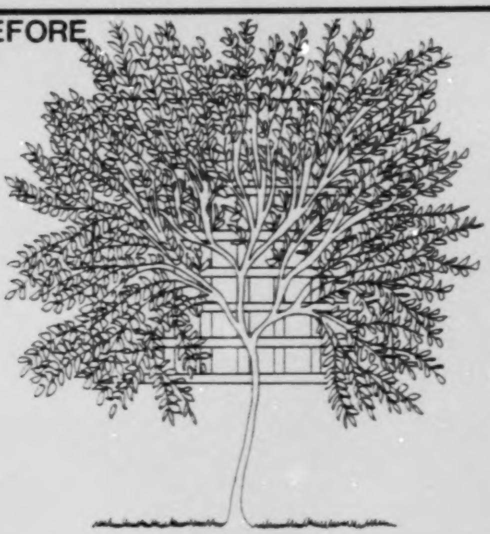
6. Start second group of horizontal branches 12 to 18 inches above the bottom wire.

7. Prune back the central leader and other vertical branches if desired.

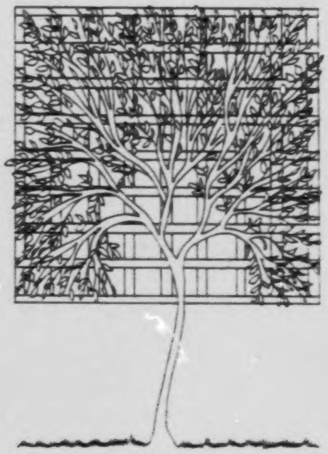
8. An established espaliered plant in a container may be purchased from a local garden center or nursery. Use this specimen to demonstrate and practice the pruning techniques outlined on Information Sheet 8.

PRUNING VINES

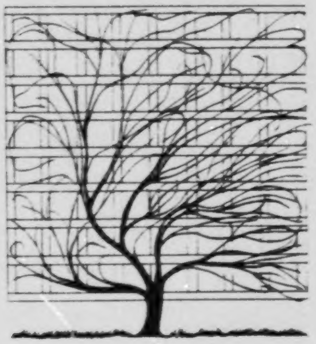
A. BEFORE



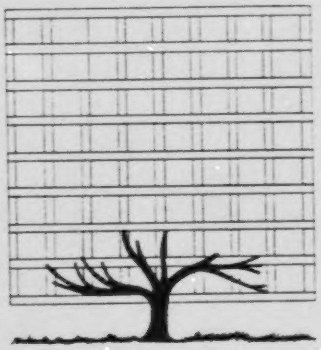
AFTER



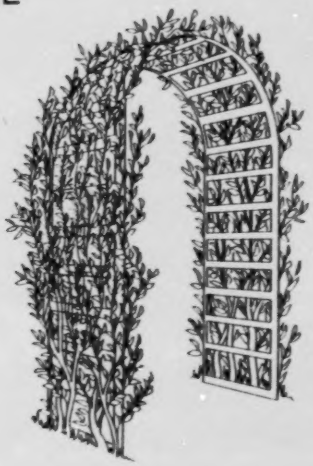
B. BEFORE



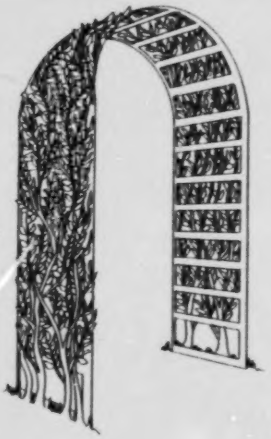
AFTER



C. BEFORE



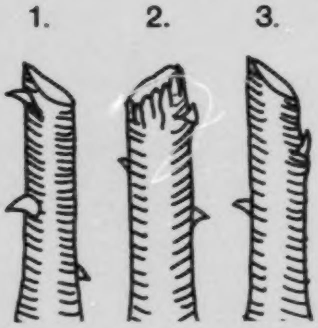
AFTER



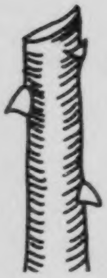
MAKING PRUNING CUTS

A. INCORRECT

1. BUD FACING THE WRONG WAY
2. CUT TOO CLOSE TO BUD
3. CUT TOO FAR FROM BUD

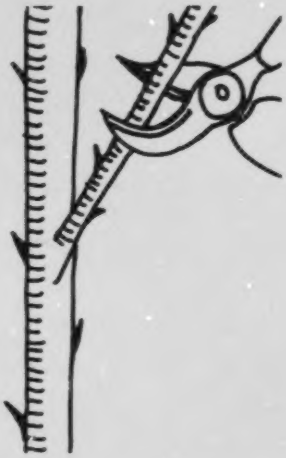


CORRECT

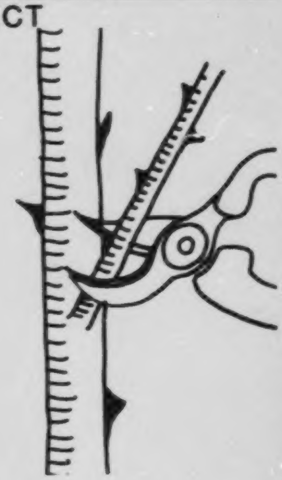


B. INCORRECT

PRUNING SHEARS MAKING CUT TOO HIGH, LEAVING A STUB.

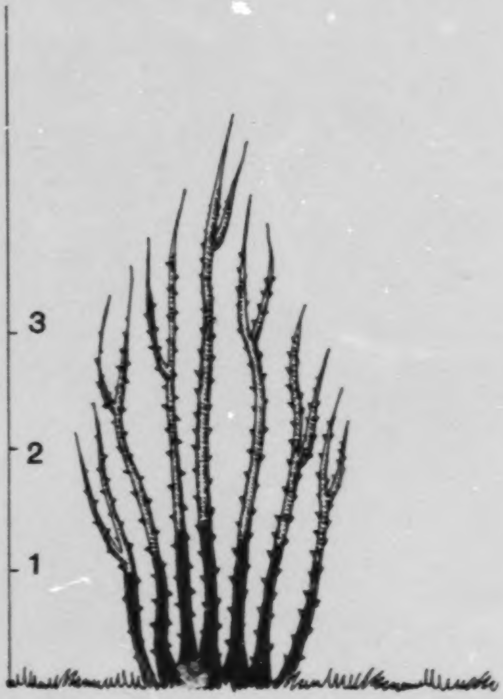


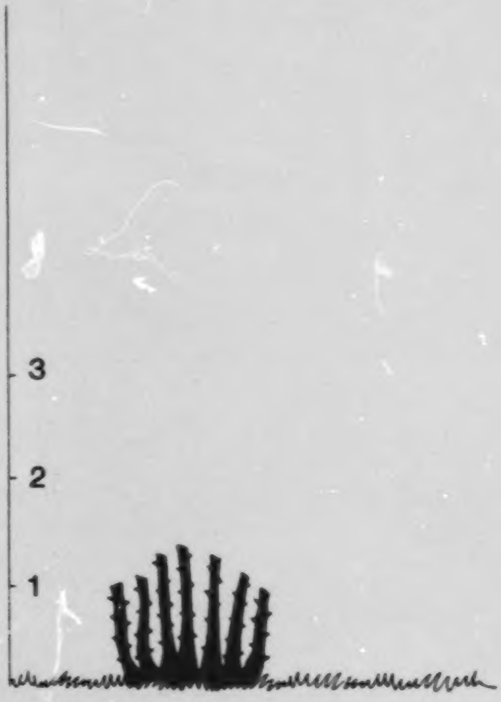
CORRECT



LATE WINTER PRUNING: BUSH ROSES

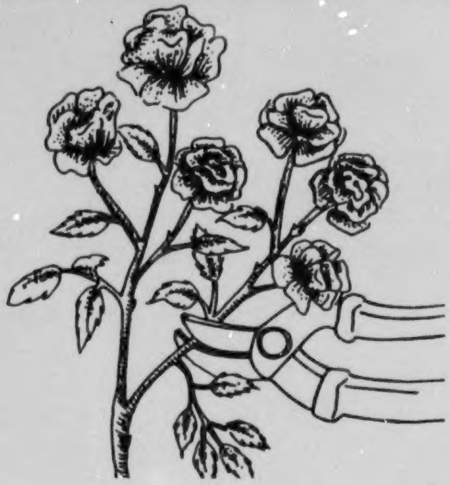
PRUNE BUSH ROSES BACK TO 15″ TO 18″ CANES IN LATE WINTER AFTER DANGER OF FROST HAS PAST. REMOVE ALL DEAD, DISEASED, AND WEAK, STEMS.



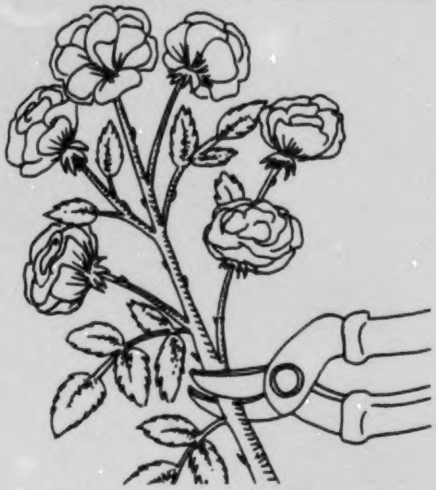


SUMMER PRUNING: BUSH ROSES

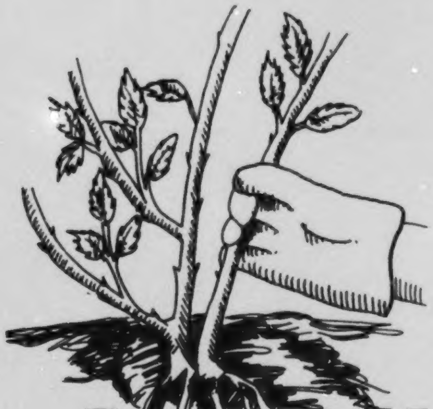
A. HYBRID TEA / GRANDI FLORA



B. FLORIBUNDA

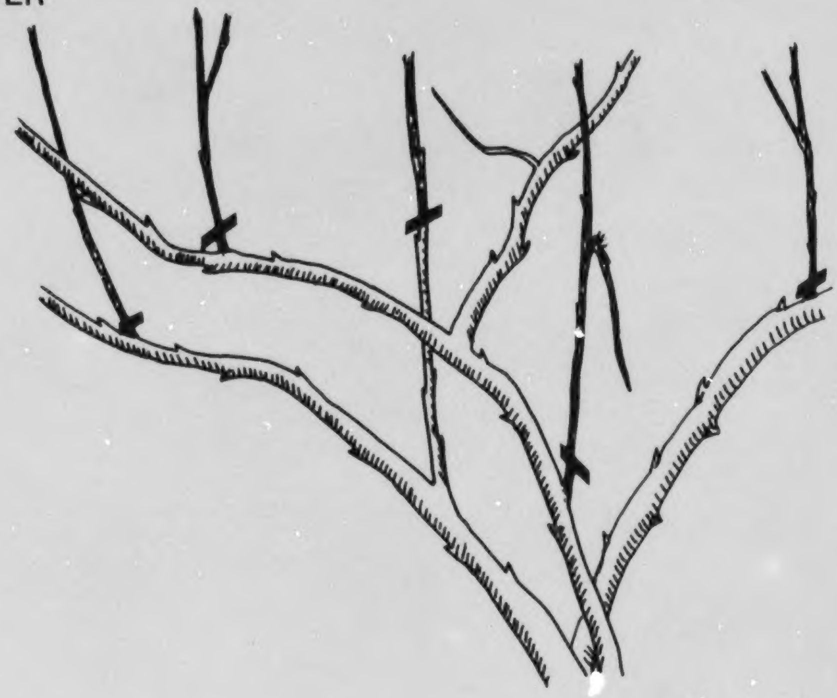


C. SUCKER GROWTH: REMOVAL OF

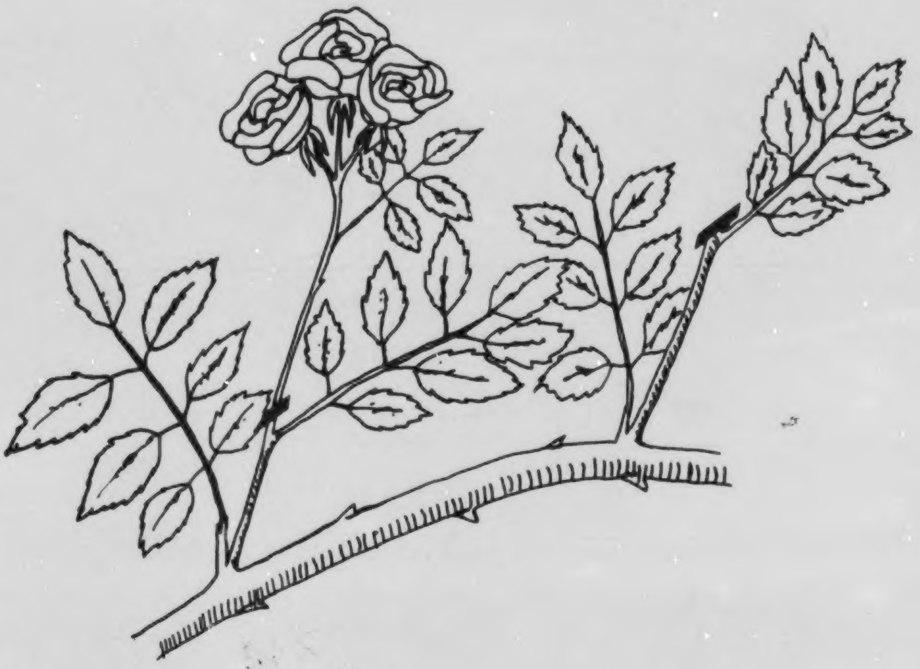


PRUNING CLIMBING ROSES

LATE WINTER



SUMMER



TRANSPARENCY DISCUSSION GUIDE

PRUNING BONSAI, ESPALIER, TOPIARY, VINES, AND ROSES

I. Transparency--PRUNING VINES

A. To restrict growth, trim back lateral shoots and remove old, woody stems.

B. To prevent a tangle of shoots on vines such as clematis, cut back stems in late winter to 12 inches from the ground. Make cuts above a new bud.

C. Trim new growth on vines throughout the growing season to maintain the desired appearance and shape.

II. Transparency--MAKING PRUNING CUTS

A. Cut no more than ¼ inch above an outward-facing bud. A cut too close may damage the bud and a cut too high may cause the stem to die back. Angle the cut so it slants back and away from the bud.

B. When removing a stem, make the cut flush with the main cane. Use sharp pruning shears to make a clean cut.

III. Transparency--LATE WINTER PRUNING-BUSH ROSES

A. Prune bush roses back to 15" to 18" in late winter after the danger of a hard frost has passed.

B. Remove all dead, diseased, and weak stems.

IV. Transparency--SUMMER PRUNING-BUSH ROSES

A. When blooms have faded, cut back to a point just above an outward facing bud for hybrid teas and gradifloras.

B. Remove the entire flower cluster to the first leaf bud for floribundas.

C. Remove all suckers from below the graft union.

V. Transparency--PRUNING CLIMBING ROSES

A. Remove dead, diseased, or spindly canes in late winter.

B. After blooms have faded in the summer, cut back stems to within 2 or 3 buds of a main stem.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

PRUNING BONSAI, ESPALIER, TOPIARY, VINES, AND ROSES

SHORT ANSWER:

1. Define the following horticultural terms:

    a. Bonsai - Living works of art consisting of trees and shrubs artificially planted in small containers to reproduce in miniature, landscapes found in nature.
    b. Espalier- A tree or shrub trained to create a two-dimensional effect either against a wall or a wire/wood trellis. The term also can describe the technique of training plants to a flat plane.
    c. Topiary - A practice used in formal gardens or settings in which plant material is trimmed and trained in the shape of birds, animals, or various geometric shapes.

2. Briefly describe the procedures for training an espalier:

    Prune central leader to height of first wire. Wait for new shoots. Train two best shoots to bottom wire. Prune excess. Allow central leader to continue. Train other shoots horizontally.

3. List 3 plants that are recommended for:

    a. bonsai - Japanese maple, Jade plant, Juniper
    b. espalier - Pear trees, Firethorn, Crabapple
    c. topiary - Taxus, Boxwood, Privet

4. List 4 reasons for pruning bonsai plantings:

    a. To reduce the size of the branches
    b. To hold the plant within the bounds of the container
    c. To change the direction of a branch
    d. To thin out dense growth

5. How can espalier plantings be used in the home landscape?

    a. To conserve space
    b. Cover up bare wall and foundations
    c. Provide a focal point in the landscape

6. How are climbing roses pruned?

    Climbing roses are pruned after flowering. Old heavy canes are cut back to ground level. All dead or weak canes are removed.

TRUE OR FALSE:

False 1. In bonsai plantings, 2/3 of the roots should be pruned prior to initial planting.

True 2. Plants to be pruned for topiary designs should have small, dense leaves and be able to tolerate constant clipping.

False 3. Espaliers are plants that are trimmed and trained to form the shapes of birds, animals, or geometric designs.

False 4. Bush roses, such as hybrid teas, flower on old or previous season's wood.

False 5. The best time to prune bush roses is in the fall before the ground freezes.

True 6. To produce large blooms, bush roses should be pruned hard to 3 buds above the base of the plant.

False 7. Climbing roses should be severely pruned in late winter to insure a large number of flowers.

True 8. Flowering vines, such as clematis and honeysuckle, should be pruned shortly after they have bloomed.

False 9. When making pruning cuts on roses, cut no more than 1 inch above an outward-facing bud.

MATCHING:

Column I

F 1. Training plants to form geometric shaped

A 2. An example of a plant suitable for topiary

G 3. A type of bush rose

I 4. Training plants to grow against a flat surface

H 5. A type of vine that can fasten itself to a support or wall

C 6. Using wire and pruning techniques to maintain miniature plants

Column II

A. boxwood
B. crabapple
C. bonsai
D. everblooming
E. clematis
F. topiary
G. hybrid tea
H. English ivy
I. espalier

UNIT L: LANDSCAPE DESIGN, ESTABLISHMENT, AND MAINTENANCE

PROBLEM AREA: USING MULCHES IN THE LANDSCAPE

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The problem area can be taught during a landscape maintenance unit or at anytime during the school year.

The estimated instructional time for this problem area is 5 to 7 days depending on how far the teacher wishes to go in developing specialized landscape maintenance skills. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapts these materials to their local situations.

CREDIT SOURCES:

These materials were developed through a funding agreement, R-33-24-D-0362-466 with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed as policy or opinion of the State Board of Education or its staff.

The teacher's guide, information sheets, student worksheets, laboratory exercises, transparency discussion guide, and test questions were developed by Janet L. Henderson, Department of Vocational and Technical Education, University of Illinois and reviewed by Paul E. Hemp and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Landscape design, establishment, and maintenance

II. Problem area: Using mulches in the landscape

III. Objectives: At the close of this problem area, students will be able to:

1. Identify different types of materials used for mulching purposes.
2. Discuss the main reasons for using mulches in different landscape settings.
3. Given specific landscape settings, compare and contrast the effectiveness of using different materials for mulching purposes.
4. Calculate the amount and estimated cost of different types of mulches in various landscape settings.
5. Describe how to apply mulches during different seasons of the year.
6. Discuss the positive and negative characteristics of different types of mulching materials.
7. Describe the procedures for composting organic materials.
8. Describe how to build a compost bin.

IV. Suggested interest approaches:

1. Take a walking tour of the area surrounding the school. Encourage students to observe the different types of materials being used as mulches.
2. Display various types of materials used for mulching purposes (Examples - bark chips, peanut hulls, straw, crushed stone, black plastic.) Ask students to evaluate the effectiveness of each type in different landscape settings.
3. Discuss the advantages of using mulches. Ask the following lead questions:
    a. What happens when raindrops splash on bare soil?
    b. What types of mulching materials would prevent surface soil erosion?
    c. What other purposes do you think mulches serve?

V. Anticipated problems and concerns of students:

1. What is a mulch?
2. What materials can I use for mulches?
3. Why should I use mulches in landscape settings?
4. How do mulches differ?
5. How can I calculate the amount of mulch to use in a given landscape area?
6. How do I apply mulches?
7. What mulches should I use for different landscape settings?
8. What is compost?
9. How do I make a compost bin?
10. What materials do I use to make compost?
11. What are some problems I may encounter with my compost bin?
12. How can I tell when my compost is ready?
13. How can I use my compost?

VI. Suggested learning activities and experiences:

1. Conduct a study trip to a local garden center to observe different types of mulches. Have students compare the packaging, pricing, and advertising of different types of mulches.
2. Conduct a study trip to an arboretum, city park, or other landscaped area. Have students observe the different types of materials being used as mulches. Encourage students to consider the reasons why certain types of mulches were selected for given landscape areas.
3. Have students build and maintain a compost bin. The compost can be used for mulching purposes on the school grounds. Excess compost can be packaged for sale to community homeowners. Use Laboratory Exercise 2 to plan this activity.
4. Have students practice calculating the amount and estimated cost of various mulches. Use Student Worksheet 2 to plan this activity.
5. Have students design and draw a landscape area that includes different types of mulches in the planting beds.

6. Create a display area for different types of mulches. This area could be used for instructional purposes and as an informational display for local homeowners. Use Laboratory Exercise 1 to plan this activity.

7. Have students practice applying different mulches to landscape beds on the school grounds.

8. Invite a landscape designer to attend class as a resource person. Encourage him or her to discuss the types of mulches used in landscape designs, how different mulches are applied, and how mulches are selected for different designs.

9. Have students select the appropriate mulch for a given landscape setting. Allow them to explain their reasons for selecting a particular mulch. Use Student Worksheet 3 to plan this activity.

10. Using the mulches displayed in Laboratory Exercise 1 compare and contrast the effectiveness of different types of mulch. Use Student Worksheet 1 to plan this activity.

VII. Application procedures:

1. Students preparing for careers in the horticulture industry will need an understanding of materials used for mulches and the specific skills for selecting and applying these materials.

2. Knowledge of mulching materials will be useful for students planning and conducting home improvement and SOE projects.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Review and evaluate student exercises.

3. Evaluate student progress during laboratory exercises.

IX. References and aids:

1. Landscape Facts, Cooperative Extension Service, The Ohio State University, 2001 Fyffe Court, Columbus, Ohio 43210

    a. Mulches Serve Many Purposes
    (LF - CP 2 - 69)

2. U.S. Department of Agriculture, Superintendent of Documents, U.S. Government Printing Office, Washington, DC, 20402

    a. Mulches for Your Garden
    (Home and Garden Bulletn No. 185)

INFORMATION SHEET 1

USES FOR MULCHES

Materials applied to the surface of the soil as a protective covering are called MULCHES. These materials may be organic or inorganic. Mulches serve many useful purposes. They can:

1. suppress weeds.
2. maintain a uniform soil temperature by acting as an insulator, thus reducing damage by freezing and thawing.
3. increase the water-holding capacity of light sandy soils.
4. increase the aeration of heavy clay soils as they become mixed with the top layer of soil.
5. prevent and reduce surface soil erosion and soil compaction.
6. add organic matter to the soil and improve soil tilth.
7. reduce the evaporation of water from the soil.
8. create a desirable appearance in the landscape setting.
9. protect fruits and vegetables prior to harvest.
10. promote extensive root systems in the upper 2 inches of the soil.
11. increase the breakdown of organic matter, thus releasing nutrients for plant growth.

Mulching materials also have some negative characteristics:

1. mulches cannot suppress large weeds.
2. some mulches may be flammable.
3. rodents and insects may live and overwinter in mulch.
4. mulches cannot prevent disease and may in fact introduce certain plant diseases.
5. some mulches severely reduce the nitrogen level of the soil.
6. mulches may encourage slug and snail infestation.
7. mulches can prevent moisture from penetrating the soil surface.
8. mulches can be unpleasant and difficult to handle.

INFORMATION SHEET 2

TYPES OF MULCHES

	Characteristics		
Name	Positive	Negative	Uses
1. Shredded Bark	*long -lasting *allows moisture to penetrate	*can be stringy and difficult to manage	*perennial beds *landscape beds
2. Decorative Wood Chips	*long-lasting *available in various sizes	*may be expensive *not a good source of organic matter	*landscape beds in public area
3. Straw	*inexpensive *light weight	*may blow away *may contain weed seeds *flammable *may attract rodents	*turf areas *winter protection of perennials *summer mulch for fruits and vegetables
4. Gravel Chips, Crushed Stones	*permanent covering *retain heat and warm the soil	*do not suppress weeds *expensive	*highlight landscape features
5. Black Polyethylene Film	*suppresses all weeds *absorbs heat and eliminates moisture evaporation	*may blow away if not weighted down *no aesthetic appeal	*vegetable garden *place beneath wood ships or gravel in landcape beds
6. Crushed Corncobs	*good weed inhibitor *retain soil moisture	*tie up nitrogen in soil *difficult for water to penetrate soil surface	*vegetable garden *annual or perennial beds
7. Sawdust	*inexpensive *readily available	*ties up Nitrogen in the soil fire hazard *unattractive to worms	*add to compost *vegetable gardens

	Name	Characteristics		Uses
		Positive	Negative	
8.	Lawnclippings	*readily available *source of nutrients for the soil	*get matted and moldy when wet *when spread thickly will begin to rot	*mix with other organic materials *vegetable gardens
9.	Leaves	*add essential elements to the soil *readily available	*tend to mat and become soggy	*mix with other organic materials *perennial beds, vegetable gardens
10.	Cocoabean Hulls	*absorb heat and warm the soil *attractive dark brown color	*develop mold when wet *light weight; may blow away	*landscape beds in public area
12.	Peatmoss	*free of weed seed *good soil conditioner	*absorbs surface moisture preventing penetration *dries out rapidly forming crust on surface	*good mulch for plants requiring an acid soil
13.	Shredded Newspaper	*readily available *excellent method of recycling	*unattractive *light-weight; may blow away	*mix with other organic materials *vegetable gardens
14.	Compost	*slowly adds nutrients to the soil *good method of recycling organic materials	*if not properly prepared will tend to mat and rot	*soil conditioner *winter mulch for garden *summer mulch for perennials, annuals, and ornamentals
15.	Peanut Hulls	*light weight *decompose quickly and add organic matter to the soil	*may develop mold when wet	*good mulch for tomato plants *annual and perennial beds
16.	Pine Needles	*light weight *weed-free *easy to handle *absorb little or no moisture	*unattractive to worms *coarse appearance	*good mulch for broad leaf evergreens and other ornamental shrubs

INFORMATION SHEET 3

APPLICATION OF MULCHES

SPRING:

* Loosen mulch where it has been crushed by snow.

* Rotofill winter mulches into seed beds.

* Gradually remove protective mulch from perennials; take off a thin layer at a time to prevent damage from alternate freezing and thawing.

* Leave the winter mulch off for several weeks before mulching again in late spring.

* Reapply mulch in the late spring to conserve moisture and suppress weeds; 2-3 inches is suitable for most plants.

SUMMER:

* Renew the mulch when weeds appear.

* Lightly rake mulches matted down by heavy rains to prevent mold from developing.

AUTUMN:

* Increase the mulch layer to insulate the soil and to prevent early freezing of soil moisture; 3-4 inches is suggested for most plantings.

* If a light-weight mulch is used for winter protection, placing evergreen branches on top will prevent the mulch from being blown away.

WINTER:

* After the ground has permanently frozen continue to cover perennial plants with a layer of mulch.

* The depth of the mulch layer will depend on the severity of the winter and the depth of the plant root system.

INFORMATION SHEET 4

COMPOSTING ORGANIC MATERIALS

COMPOST is organic matter undergoing a heat-fermentation process. This heating is generated by bacterial activity and may develop temperatures as high as 150°F near the center of the compost pile.

COMPOST BINS need to be located in the full sun and in an area exposed to all the elements. Air needs to circulate all around the bins; the decomposing bacteria need air to live. Build compost bins out of decay-resistant wood, bricks, concrete blocks, and/or wire fencing. Each bin should be 4 to 6 feet high, 3 to 5 feet wide, and any convenient length. Make one side of the bin removable for adding and removing the organic matter.

Lawn clippings, leaves, garden weeds, harvested vegetables, potato peelings, stems and flowers from herbaceous plants, shredded newspaper, straw, pine needles, manure, and coffee grounds are all suitable materials for composting. Avoid using diseased plants, animal fats or remains, and woody stems.

Fill the compost bin with alternate layers of organic material 6 to 12 inches thick and of garden soil 1 inch thick. To each layer of organic matter add 3 cups of 5-10-5 fertilizer and 2/3 cup of ground dolomitic limestone. Moisten the organic material thoroughly. Repeat this layering process until the bin is full.

The purpose of turning compost is to let more air circulate and to speed up the rate of composting. In areas that have cool frosty winters, compost made in November and December can be turned the following May or June.

Fully composted organic matter will smell sweet and earthy, having a light, crumbly texture and a dark brown color. Compost can be used as a summer mulch for annual and perennial beds, as a permanent mulch around ornamental trees and shrubs, and as a side-dressing mulch in vegetable gardens. Compost also makes an excellent soil conditioner when incorporated into the top layers of the soil surface.

DO NOT fill the compost bin with only one ingredient. The amount and variety of bacteria will be lacking for composting to take place effectively. The heap will rot down instead of composting.

DO NOT allow the compost bin to dry out. If the compost dries out the bacteria will die and the composting stops.

DO NOT allow the compost bin to become too wet for the bacteria to work. Be sure air can circulate and cover the bin with plastic during heavy rains and prolonged wet periods.

STUDENT WORKSHEET 1

CHECKLIST FOR COMPARING MULCHES

PROCEDURE: Display several kinds of materials used for mulching. Have students complete the checklist comparing the different types of mulches.

TYPE OF MULCH: ____________________

Criteria	Comments
1. Cost	____________________
2. Availability	____________________
3. Weight and bulk	____________________
4. Appearance	____________________
5. Water penetration	____________________
6. Moisture retention	____________________
7. Insulative value	____________________
8. Fire hazard	____________________
9. Lasting qualities	____________________
10. Wind effect	____________________
11. Odor	____________________
12. Decomposition characteristics	____________________
13. Decorative appeal	____________________
14. Maintenance requirements	____________________

STUDENT WORKSHEET 2

CALCULATNG THE AMOUNT AND COST OF DIFFERENT TYPES OF MULCHES

Mulch	Price	Amount Needed for 2 Inch Cover
Wood Chips	$3.99/25 lb. bag	50 lbs./18 sq. ft.

How many 25 lb. bags of wood chips will be needed to mulch a 3' x 25' landscape bed?

_____ bags

What will be the total cost for the wood chips?

$_______

Mulch	Price	Amount Needed for 2 Inch Cover
Crushed stone	$5.75/50 lb. bag	8 lbs./1 sq. ft.

How many 50 lb. bags of crushed stone will be needed for a 5' x 15' patio area?

_____ bags

What will be the total cost for the crushed stone?

$_______

Mulch	Price	Amount Needed for 2 Inch Cover
Straw	$1.50/bale	1/4 bale/20 sq. ft.

How many bales of straw will be needed to winter mulch a 25' x 50' vegetable garden?

_____ bales

How much will the straw mulch cost?

$_______

Mulch	Price	Amount Needed for 2 Inch Cover
Peanut hulls	$7.36/3 cubic ft. bag	1 cu. ft./80 sq. ft.

How many 3 cubic foot bags of peanut hulls will be needed to cover a 4' x 120' perennial bed?

_____ bags

What will be the cost of mulching the bed with peanut hulls?

$________

What would be the cost of mulching the bed with wood chips?

$________

STUDENT WORKSHEET 3

SELECTING MULCHES

PROCEDURE: Ask students to select a mulch for each landscape setting and to provide the reasoning for their selection.

LANDSCAPE SETTING	MULCH SELECTION	REASONS FOR SELECTION
1. Entrance planting by driveway		
2. Vegetable garden with tomatoes and cucumbers		
3. Annual garden bordering a patio		
4. Shade trees in the public area of the landscape		
5. Shrubs by the side of the house in a natural setting		

LABORATORY EXERCISE 1

DISPLAYING MULCHES

PURPOSE: The purpose of this laboratory exercise is to create a display area for different types of mulches that can be used for instructional purposes and as an educational display for community homeowners.

MATERIALS:

1. various types of mulches
2. storage bins (ex., coffee cans, aluminum pans, Styrofoam trays)
3. labels
4. permanent markers

PROCEDURES:

1. Obtain different types of mulches for display.

2. Select the type of storage bin for displaying the mulches.

3. Fill bins with the mulches.

4. Prepare display labels for each type of mulch. Include the following information on the labels: name of mulch, uses, negative characteristics, and application procedures.

5. Secure the labels to the storage bins.

6. Display the mulches in the classroom, laboratory area, or a display case in another part of the school.

LABORATORY EXERCISE 2

BUILDING A COMPOST BIN

PURPOSE: The purpose of this laboratory exercise is to construct a compost bin and maintain compost mulch.

MATERIALS:

1. wire fencing
2. concrete blocks
3. rot-resistent boards
4. fence posts
5. organic matter
6. 5-10-5 fertilizer
7. ground dolomitic limestone
8. pitchfork

PROCEDURES:

1. Select a sunny, exposed area for the compost bin.
2. Clear a space of ground at least 4' x 8' for the bin.
3. Attach wire fencing or boards to concrete blocks or solid fence posts. The dimensions of the bin should be 4 to 6 feet high, 3 to 5 feet wide, and any convenient length (usually 3 to 5 feet long). Refer to Transparency IV.
4. Make one side of the bin removable.
5. Make sure air can circulate all around the bin.
6. On the bottom, place 6 to 12 inches of organic matter, sprinkle with 3 cups of 5-10-5 fertilizer and 2/3 cup of ground dolomitic limestone, add 1 inch of soil. Repeat this layering process until the bin is full.
7. Thoroughly water the compost bin and keep the bin moist during dry spells.
8. Pack the materials tightly around the edges, and lightly in the center so the middle area settles more than the edges and water does not run off.
9. Allow the materials to decompose undisturbed during the winter. In late spring (May or June) turn the compost and use for mulching purposes throughout the landscape.

TEACHER'S KEY

STUDENT WORKSHEET 2

CALCULATNG THE AMOUNT AND COST OF DIFFERENT TYPES OF MULCHES

Mulch	Price	Amount Needed for 2 Inch Cover
Wood Chips	$3.99/25 lb. bag	50 lbs./18 sq. ft.

How many 25 lb. bags of wood chips will be needed to mulch a 3' x 25' landscape bed?

__9__ bags

What will be the total cost for the wood chips?

$35.91

Mulch	Price	Amount Needed for 2 Inch Cover
Crushed stone	$5.75/50 lb. bag	8 lbs./1 sq. ft.

How many 50 lb. bags of crushed stone will be needed for a 5' x 15' patio area?

__12__ bags

What will be the total cost for the crushed stone?

$69.00

Mulch	Price	Amount Needed for 2 Inch Cover
Straw	$1.50/bale	1/4 bale/20 sq. ft.

How many bales of straw will be needed to winter mulch a 25' x 50' vegetable garden?

__16__ bales

How much will the straw mulch cost?

$24.00

Mulch	Price	Amount Needed for 2 Inch Cover
Peanut hulls	$7.36/3 cubic ft. bag	1 cu. ft./80 sq. ft.

How many 3 cubic foot bags of peanut hulls will be needed to cover a 4' x 120' perennial bed?

2 bags

What will be the cost of mulching the bed with peanut hulls?

$14.72

What would be the cost of mulching the bed with wood chips?

$212.79

TEACHER'S KEY

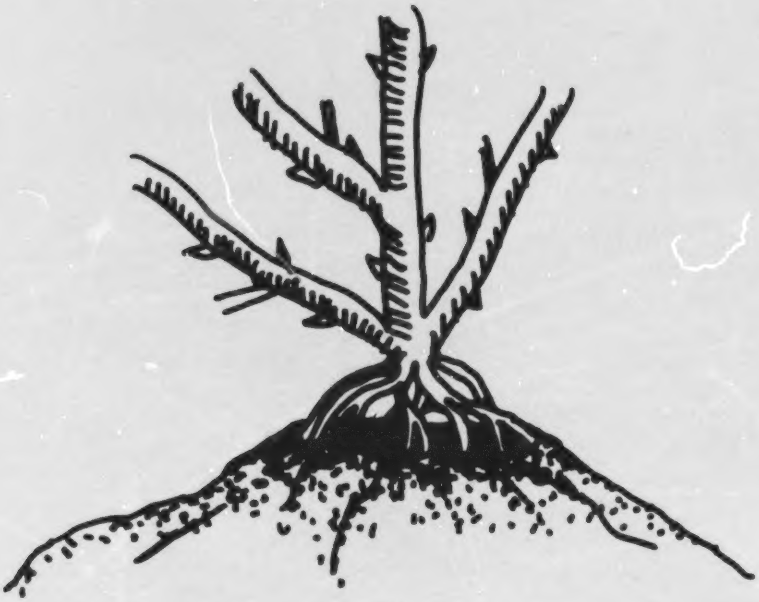
STUDENT WORKSHEET 3

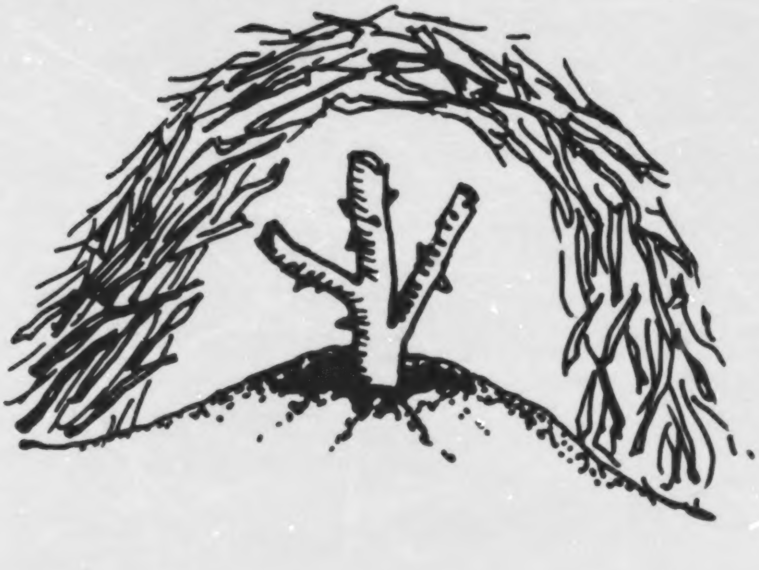
SELECTING MULCHES

PROCEDURE: Ask students to select a mulch for each landscape setting and to provide the reasoning for their selection.

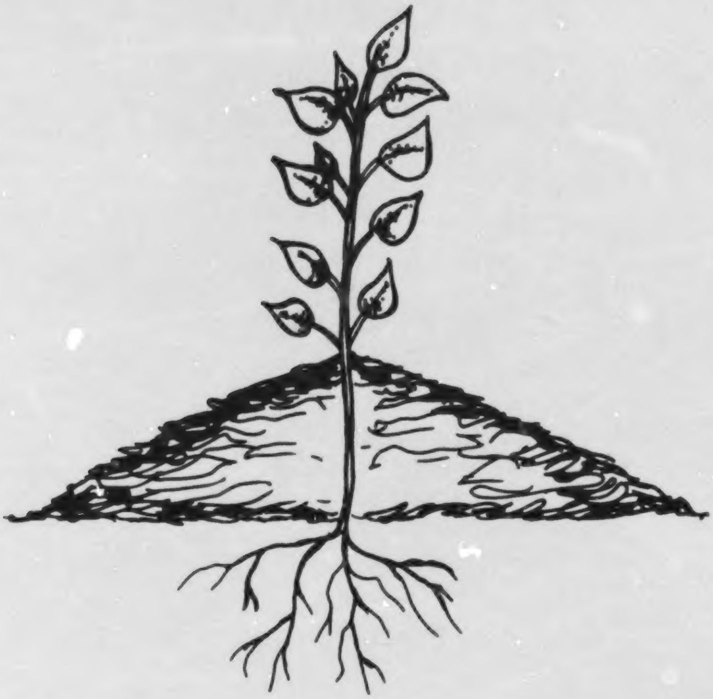
LANDSCAPE SETTING	MULCH SELECTION	REASONS FOR SELECTION
1. Entrance planting by driveway	Wood Chips	decorative mulch; long-lasting material
2. Vegetable garden with tomatoes and cucumbers	Compost	Adds nutrients to the soil; can be incorporated into the soil after harvest
3. Annual garden bordering a patio	Cocoabean Hulls	attractive dark brown color
4. Shade trees in the public area of the landscape	Shredded Bark	long-lasting material; provides natural look in the public area
5. Shrubs by the side of the house in a natural setting	Leaves	not in the public area; readily available; add some nutrients to soil

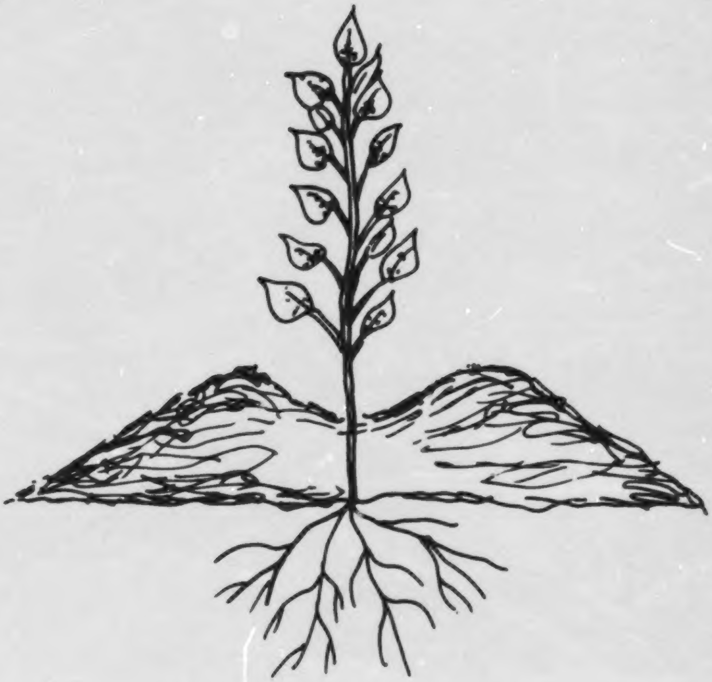
WINTER PROTECTION



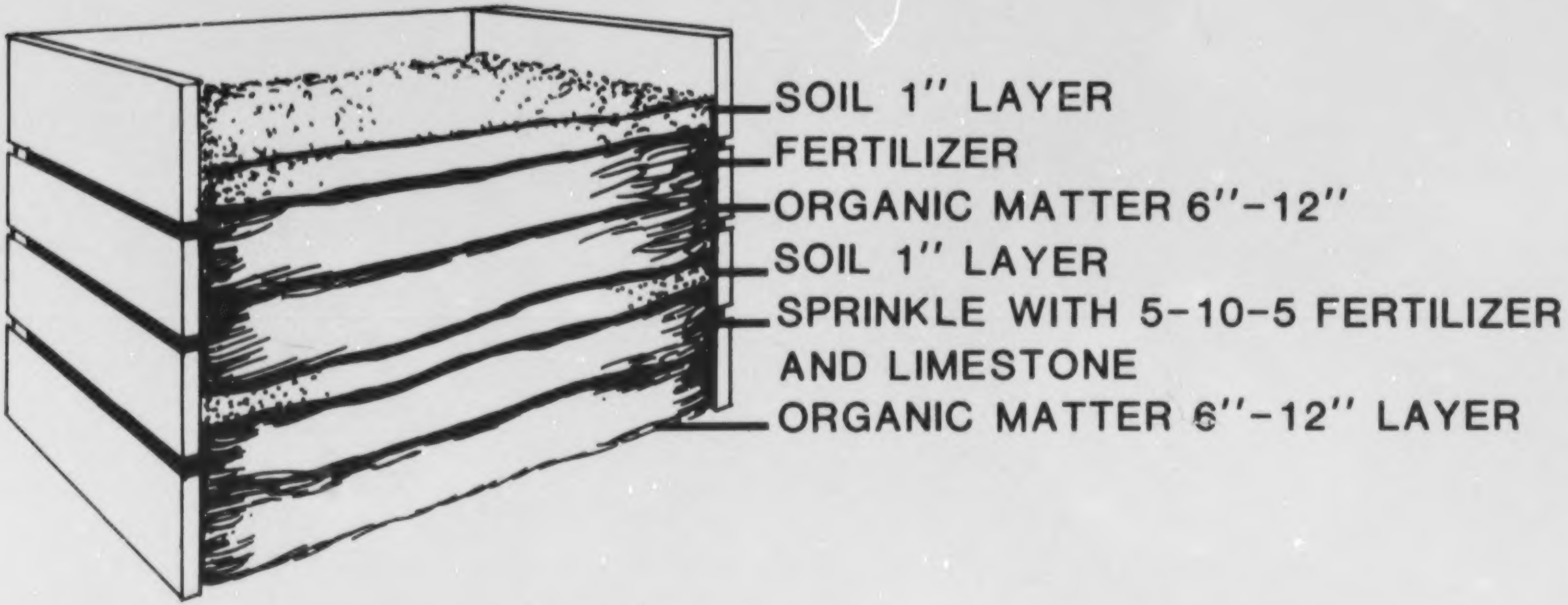


MULCHING METHODS

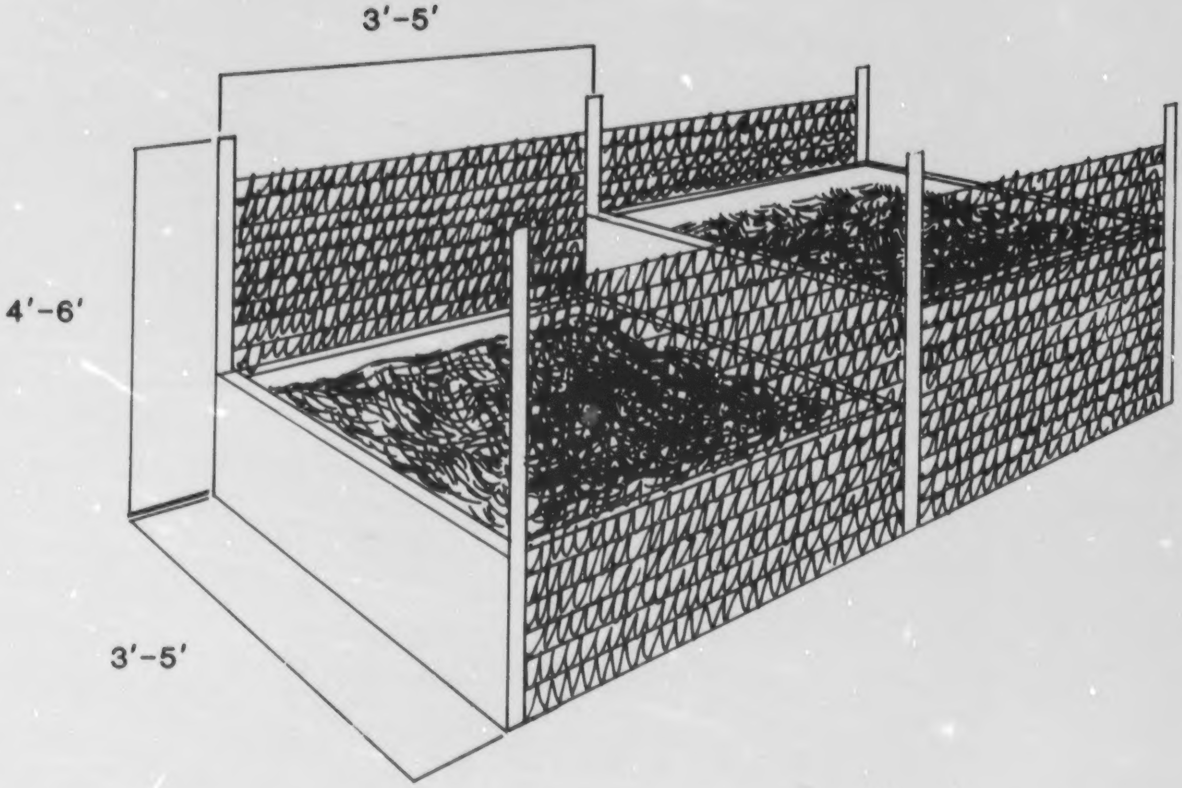




COMPOSTING LAYERS


SOIL 1'' LAYER
FERTILIZER
ORGANIC MATTER 6''-12''
SOIL 1'' LAYER
SPRINKLE WITH 5-10-5 FERTILIZER AND LIMESTONE
ORGANIC MATTER 6''-12'' LAYER

COMPOST BIN CONSTRUCTION



TRANSPARENCY DISCUSSION GUIDE

USING MULCHES IN THE LANDSCAPE

I. Transparency--WINTER PROTECTION

  A. Alternate freezing and thawing can heave plants out of the ground causing root damage.

  B. Mulches offer excellent winter protection for perennial plants.

II. Transparency--MULCHING METHODS

  A. In rainy weather, slightly mound mulches to encourage water to run off.

  B. In dry weather, make a moat around the plant to collect water which will penetrate through the mulch.

III. Transparency--COMPOSTING

  A. Alternate layers of organic matter, fertilize, and soil should be added to the compost bin.

IV. Transparency--COMPOST BIN CONSTRUCTION

  A. The dimension of the compost bin should be 4 to 6 feel high, 3 to 5 feet wide, and any convenient length (usually 3 to 5 feet long).

  B. A wire fencing material may also be used to construct a temporary or portable compost bin.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

USING MULCHES IN THE LANDSCAPE

SHORT ANSWER:

1. Describe 2 advantages and 2 disadvantages of using mulches.

   Advantages:

   a. Mulches prevent and reduce surface soil erosion and soil compaction.

   b. Mulches protect fruits and vegetables prior to harvest.

   Disadvantages:

   a. Mulches cannot suppress large weeds.

   b. Rodents and insects may live and overwinter in mulch.

2. Identify one positive and one negative characteristic of the following mulches:

   a. Wood chips - long lasting mulch; may be expensive

   b. Straw - light weight; fire hazard

   c. Sawdust - inexpensive; ties up nitrogen in the soil

   d. Leaves - readily available; tend to mat and become soggy

   e. Pine needles - weed free; unattractive to worms

3. Why should mulches gradually be removed from perennials in early spring?

   If mulches are removed too early in the spring the plants may heave out of the ground from the alternate freezing and thawing.

4. What types of organic materials can be added to a compost bin?

   a. Lawn clippings
   b. Leaves
   c. Weeds
   d. Pine needles
   e. Manure
   f. Shredded newspaper

5. How can compost be used in the landscape?

   Composted materials can be used as mulches for annuals, perennials, and ornamental shrubs and trees. Compost can be used as a side-dressing and as a soil conditioner.

TRUE OR FALSE:

False 1. For best results compost bins should be filled with one ingredient such as leaves.

False 2. Compost bins should be placed in a protected shady area.

True 3. Black polyethylene film used as a mulch will suppress all weeds.

True 4. Crushed corncobs can tie up nitrogen in the soil.

True 5. When used alone as a mulch, lawn clippings become matted and soggy.

MULTIPLE CHOICE:

1. An example of an inexpensive, readily available mulch that adds essential elements to the soil would be:

    a. crushed stone
    *b. leaves
    c. cocoa bean hulls
    d. black polyethylene film

2. Which of the following is not a characteristic of decorative wood chips:

    a. long lasting
    *b. tie up nitrogen in the soil
    c. available in various sizes
    d. expensive

3. Which of the following is a disadvantage of some mulches:

    a. reduce the evaporation of water from the soil
    b. add organic matter to the soil
    c. maintain a uniform soil temperature
    *d. encourage slug and snail infestation

4. Which of the following mulches is considered a fire hazard?

    a. peanut hulls
    *b. sawdust
    c. black polyethylene film
    d. shredded newspaper

5. Which of the following would be the most appropriate mulch for an entrance planting in the public area of the landscape?

    *a. decorative wood chips
    b. leaves
    c. straw
    d. lawn clippings

UNIT L: LANDSCAPE DESIGN, ESTABLISHMENT, AND MAINTENANCE

PROBLEM AREA: GROWING PLANTS IN CONTAINERS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with beginning or advanced students in vocational agriculture/horticulture programs. This problem area may be taught at anytime during the school year.

The estimated instructional time for this problem area is 5 to 7 days. If the students are involved in constructing containers additional classroom or laboratory time will need to be planned.

The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets, laboratory exercises and test questions were developed by Janet L. Henderson, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Kallie S. Grobstein, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois, and Ken McPheeters, Ornamental Horticulture Specialist, Vocational Agriculture Service, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Landscape design, establishment, and maintenance

II. Problem Area: Growing plants in containers

III. Objectives: At the close of this problem area, students will be able to:

1. Identify plant materials suitable for containers.
2. Select appropriate containers for plants.
3. Construct various types of wooden plant containers.
4. Arrange plant containers in the landscape.
5. Establish and maintain container-grown plants.

IV. Suggested interest approaches:

1. Display various types of conventional and unconventional containers that can be used for growing plants. Discuss with the students advantages and disadvantages of each item as a growing container for plants.
2. Conduct a class discussion by asking the following lead questions:
   a. In what parts of the landscape could we use container plants?
   b. In what types of containers have you seen plants growing?
   c. Why would a landscaper chose to place plants in containers?

V. Anticipated problems and concerns of students:

1. What kinds of plants can I grow in containers?
2. In what types of containers can I grow plants?
3. How do I care for plants growing in containers?
4. How do I construct a wooden plant container?
5. In what parts of the landscape can I place containers?

VI. Suggested learning activities and experiences:

1. Have each student grow a plant in an unusual container. Display the containers in the classroom or laboratory and present an award for the most unique and creative design.

2. Discuss with students the different, types of plants that can be grown in containers. Use Information Sheets 2-4 to assist in guiding the discussion.

3. Conduct a brainstorming activity by asking students to name as many types of items they can think of to use as plant containers. Display the list and evaluate the practicality of using each type of container.

4. Have each student construct a wooden plant container using the plans outlined on Laboratory Exercises 1-5. Encourage the students to use their container as a part of a home improvement project or as an entry in their local section fair.

5. Using Information Sheet 1, discuss with students the cultural practices needed for growing plants in containers. Analyze the differences and similarities between growing plants in containers and growing plants in landscape beds.

6. Have students select one type of wooden plant container that they can build as a money-making project for the school. Encourage students to divide the responsibilities of the project among themselves (i.e., ordering materials, constructing the container, painting or staining the container, advertising and taking orders). Students can prepare a short information sheet for customers that outlines the proper care needed for growing plants in containers.

7. Have students establish and maintain container gardens on the school grounds, in the school building, or in the community (ex. nursing home or park). Encourage students to consider the types of plants to use, the best location for the containers and a maintenance schedule for proper plant care.

8. Have students prepare containers for bulb forcing. Use Laboratory Exercise 6 to plan this activity. Note: This learning experience must be conducted during the late fall to insure an adequate length of time for cold storage.

9. Have students construct two or more root-viewing boxes (Laboratory Exercise 5). Use the boxes to compare plant growth in different soil mixes or with different rates and methods of fertilization.

10. Using Information Sheet 2 - Flowering Annual Plants for Containers, have students practice combining several types of annuals for container gardens. Use Student Worksheet 1 to plan this activity. Encourage students to consider flower height and color when choosing annuals for different containers.

VII. Application procedures:

1. The purpose of this problem area is to acquaint students with the types of plants and containers that can be used in container gardening. Practical, hands-on experience should be provided to develop skills in establishing and maintaining container gardens.

2. Knowing how to grow plants in containers can be useful for students developing SOE/home improvements projects with limited space. Container gardening would be an excellent way to incorporate plants into an urban setting.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate student performance when constructing wooden planters.

IX. References and aids:

1. Container and Hanging Gardens. Ortho Books, Chevron Chemical Company, 575 Market Street, San Francisco, CA, 94105. (This 96 page book is one in a series of Ortho gardening books. This reference is available at most bookstores or garden centers and is recommended as a primary source of information for this problem area).

2. Reader's Digest Illustrated Guilde To Gardening. Calkins, C.C. (ed.). The Reader's Digest Association, Inc., 1978.

INFORMATION SHEET 1

CULTURAL TIPS FOR CONTAINER GARDENING

SOIL

A soilless or synthetic planting mix is usually recommended for container gardens. Peat moss, sawdust, pine bark, vermiculite, perlite, and sand are used in varying amounts in soiless mixes. Trade names for soilless planting mixes include: Redi-Earth, Jiffy Mix, Metro Mix, and Pro-Mix.

Ready-made planting mixes are preferred over garden soils for several reasons. They are lightweight in nature, weighing up to less than half the weight of garden soil when both are wet. Synthetic mixes have been sterilized and are free of disease organisms, weed seeds, and insects. Nutrients needed for initial plant growth are included in the soilless mixes.

Some containers may drain slowly, leaving the planting mix soggy. Other containers may drain quickly, leaving the planting mix dry. The different ingredients in the soilless mix must allow enough water to drain through the container, while at the same time providing a reservior of water and sufficient air space for proper plant growth.

Home-made planting mixes also may be used for container gardens. To make a cubic yard of mix, add together 14 cubic feet of peat moss, 7 cubic feet of vermiculite, and 7 cubic feet of perlite. Dampen the mix as you go. Add 5 pounds of ground limestone and 5 pounds of 5-10-5 fertilizer. The ingredients must be thoroughly mixed together.

Fertilizer

The amount of fertilizer needed at one time for container gardens is small, but the need is constant. Time-released fertilizers may be added to the mix prior to planting. Liquid irrigation should contain weak concentrations of fertlizers to prevent injury to plant roots. Plants growing in containers require constant attention to insure that adequate amounts of plant nutrients are available for plant growth. A complete fertilizer is normally recommended for container gardens and is applied through out the growing season. Check the labels for rates of application.

Containers

Many items can be used as plant container, the only limitations may be one's imagination. However, several points need attention. Porous clay pots will need watered more frequently than plastic or ceramic containers. Be careful not to overwater plastic and ceramic pots. These types of containers do not "breathe" and have the tendency to get waterlogged. All containers need adequate drainage holes.

When the bottom of wooden containers are in direct contact with a moist surface they attract pests and the wood will rot. Use small blocks or casters to provide adequate air space beneath the container. Treat wooden containers with a preservative containing cooper sulfate. Do not use preservatives containing pentachlorophenol since this substance is toxic to plants.

Large pots containing several gallons of planting mix can be extremely heavy and awkward to move. Attaching wheels or casters to the bottom of the container will make moving much easier. Handtrucks and dollies are useful for transporting large containers.

The size of the container will vary with the type of plant chosen. Select a container that will accomodate the root system of the plant, and that will maintain an adequate reserve of moisture and nutrients. Plants in small containers need watered and fed more frequently than plants growing in larger pots. However, giving plants a soil depth of 18" to 24" is not a good idea, when they can grow and produce in a container 6" to 8" deep.

Watering

The frequency of watering depends on the planting mix, the type and size of the container, temperatures, wind, light levels, humidity, and type of plant. Plants should not be watered according to a rigid schedule (ex., every Thursday morning). Environmental conditions vary considerably and plants should be checked each day to determine watering needs. When the planting mix is dry, add enough water so that it drains completely through the container. Light waterings may only apply moisture to the top few inches of the planting mix.

Transplanting

Sometimes large plants become pot-bound and form a solid mass of roots inside the container. When transplanting into a new container, make 4 or 5 cuts from top to bottom, down the side of the root ball. Run your fingers through the cuts to fray the roots. Root pruning will increase the formation of new roots and penetration of roots into the planting mix.

Handle plants carefully during transplanting. Do not pull plants out of containers; gently tap them out. Remove any wrapping that is exposed above the surface of the planting mix. Set the plant in the soil mix at the same level it grew in the original container.

Pest Problems

Plants growing in containers are just as susceptible to insects and diseases as are plants growing in landscape beds. Moisture-loving pests are a special problem with container gardens. Plants should be checked frequently for any evidence of slug, snail, earwig, or sow bug damage. Do not allow moisture to accumulate underneath the container. If containers are portable, infested plants can be isolated for a short period of time to control the pest problem.

Winterizing

Protect temperature-sensitive trees and shrubs by wrapping the container with burlap. Container plants that cannot survive freezing temperatures should be moved to a warmer environment (45°-55°F).

INFORMATION SHEET 2

FLOWERING ANNUAL PLANTS FOR CONTAINERS

Many types of flowering plants can be used in container gardens. The following list describes some of the most common annuals used in containers.

1. Ageratum - blue/purple flower colors; 6"-12" high; full sun or partial shade.
2. Alyssum - white/purple/rose flower colors; 3"-8" high; use as a ground cover; full sun.
3. Celosia - yellow/gold/purple/pink/red flower colors; 6"-36" high; use dwarf varieties for containers; full sun.
4. Coleus - red/pink/green/yellow foliage colors; 12"-30" high; pinch tips to encourage branching; partial shade.
5. Dianthus - white/pink/red/violet flower colors; 3"-15" high; use dwarf varieties for containers; full sun or partial shade.
6. Fibrous Begonia - red/rose/pink/white flower colors; 6"-14" high; full sun to full shade.
7. Geranium - red/pink/salmon flower colors; 18"-24" high; good in full sun.
8. Impatiens - solid and bicolored; red/pink/white/organge/violet flower colors; 10"-20" high; good for shady areas.
9. Lobelia - lavender/blue/pink/white flower colors; 5"-8" high; trailing and compact varieties; full sun or partial shade.
10. Marigolds - yellow/gold/red/orange flower colors; 6"-36" high; sizes available for every container; full sun.
11. Nasturtium - red/orange/yellow/cream flower colors; 12"-15" high; dwarf varieties best for containers; full sun.
12. Pansy - purple/cream/blue/orange flower colors; 6"-8" high; all varieties suited for containers; full sun or partial shade.
13. Petunias - red/pink/blue/purple/yellow/orange/white flower colors; versatile annual; use in all types of containers; full sun.
14. Portulaca - red/pink/yellow/white/lavender flower colors; 6" high; trailing growth habit; thrives in hot dry areas; full sun.
15. Salvia - scarlet-red/blue/white flower colors; 6"-30" high; dwarf varieties are best for containers; usually grown for bright red flower spikes; full sun.

16. Snapdragon - red/pink/orange/yellow/bronze/purple/white flower colors; 6"-36" high; dwarf varieites best in containers; excellent cut flower; full sun.

17. Vinca - red/rose/white flower colors; 10" high; bright flower colors with glossy foliage; full sun or partial shade.

18. Zinnia - pink/red/yellow/orange/cream flower colors; 6"-30" high; dwarf varieites best for containers; full sun.

INFORMATION SHEET 3

SHRUBS AND TREES FOR CONTAINERS

Shrubs and trees that are slow growing and have a miniature or dwarf growth habit are suitable for container gardens.

Shrubs:

1. Glossy Abelia - evergreen to semi-deciduous; arching branches; grow in full sun; hardy to 0°F.
2. Purpleleaf Japanese Barberry - deciduous; dense growth habit; grow in full sun; hardy to -20°F.
3. Korean Boxwood - deciduous; can be trained into formal shapes (i.e., topiary); grow in full sun or partial shade; hardy to -15°F.
4. Red Clusterberry Cotoneaster - deciduous; arching stems; use as a portable screen, barrier, or espalier; hardy to 0°F.
5. Chinese Juniper 'San Jose' or Blue Pfitzer Juniper - evergreen ;compact growth; easily trained into many shapes; hardy in all areas.
6. English Lavender - evergreen; fragrant, purple flowers; prune to maintain compact shape; hardy all areas.
7. Mugho Pine - evergreen; pinch out soft newgrowth (candles) in spring to maintain compact shape; hardy in all areas.

Trees:

1. Japanese Black Pine - evergreen; suitable for bonsai training; handles pruning well; hardy all areas.
2. Amur Maple - deciduous; brilliant fall color; dense green foliage.
3. Japanese Maple - deciduous; many varieties with purple, red, or green leaves; low, weeping growth habit; easily trained.
4. Eastern Redbud - deciduous; showy, spring flowers; heart-shape leaves; attractive seed pods.
5. Flowering Dogwood - deciduous; excellent flower, foliage, and fruit characteristics; slow growing when young.
6. Flowering Crabapple - deciduous; beautiful spring flowers; weeping and columnar shapes available; purchase disease-resistant varieites (i.e., Sargent, Parkman, or 'Red Silver')
7. Wisteria - deciduous; a vine that can be trained as a small, single-trunked "tree"; fragrant flowers; may need support.

INFORMATION SHEET 4

SPACE-SAVING VEGETABLES

Many seed companies offer vegetable varieties specifically developed for small spaces. The following vegetables are examples of plants suitable for container gardening. Students should be encouraged to consult current seed catalogs to identify additional vegetable plants for containers.

George W. Park Seed Co.

1. Cucumber Bush Whopper
2. Cabbage Darkri
3. Parsley Paramount
4. Pepper Park's Pot
5. Squash Park's Creamy
6. Eggplant Morden Midget
7. Lettuce Pom Thumb
8. Tomato Goldie
9. Carrot Lady Finger
10. Radish Cherry Belle
11. Beet Green Top Brunching
12. Tomato City Best VF
13. Cantaloupe Busheloupe

George J. Ball Seed Company:

1. Pot Luck Cucumber
2. Satin Beauty Eggplant
3. Black-Seeded Simpson Lettuce
4. Better Belle Pepper
5. Patio Tomato
6. Small Fry Tomato
7. Sweet 100F Tomato
8. Pixie Tomato
9. Tiny Tim Tomato
10. Florida Basket Tomato
11. Minibel Tomato

STUDENT WORKSHEET 1

FLOWERING ANNUALS IN CONTAINERS

Reference - Information Sheet 2 - Flowering Annual Plants for Containers.

	Type of Container/Location	Flower(s) Choice
1.	6" clay pot/full sun/enclosed patio	
2.	36" long window box/partial shade/balcony	
3.	10 gallon plastic tub/full shade/back porch	
4.	12" hanging basket/full sun/front entranceway of home	
5.	12" decorative ceramic pot/partial shade/ front porch	
6.	18" diameter wooden tubs/full sun/ around flagpole at school	
7.	58" long wooden box container/full shade/ city park	

LABORATORY EXERCISE 1

BUILDING A WOODEN PLANT CONTAINER - EASY PLANTER

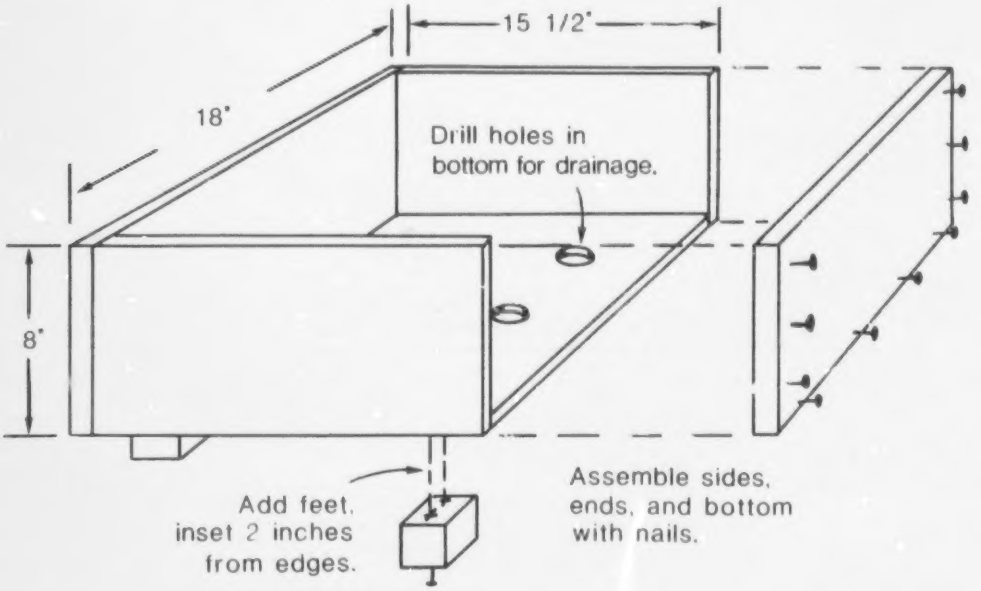
PURPOSE: The purpose of this laboratory exercise is to build a wooden planter suitable for container gardening.

MATERIALS:

1. Rough redwood (rot-resistant and heart grade):
    - a. 2 sides: 1" x 8" x 18"
    - b. 2 ends: 1" x 8" x 15½"
    - c. 4 feet: 2" x 2" x 3"
2. Exterior plywood:
    - a. 1 bottom: ½" x 15½" x 15½"
3. Galvanized box nails

PROCEDURES:

1. Use the following diagram to construct the wooden planter:


15 1/2"
18"
8"
Drill holes in bottom for drainage.
Add feet, inset 2 inches from edges.
Assemble sides, ends, and bottom with nails.

LABORATORY EXERCISE 2

BUILDING A WOODEN PLANT CONTAINER - BOX PLANTER

PURPOSE: The purpose of this laboratory exercise is to build a wooden planter suitable for container gardening.

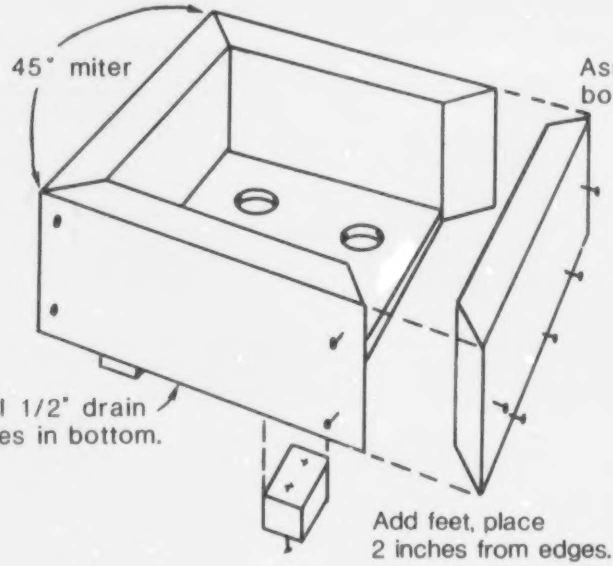
MATERIALS:

1. Finished redwood (rot-resistant and heart grade):
   a. 4 sides: 2" x 8" x 24"
   b. 4 feet: 2" x 2" x 3"
2. Exterior plywood:
   a. 1 bottom: ½" x 21" x 21"
3. Galvanized box nails

PROCEDURES:

1. Use the following diagram to construct the wooden planter:

Mitered corners give this box a more tailored look than the box-end planters.



45° miter

Assemble side and bottom with nails.

Drill 1/2" drain holes in bottom.

Add feet, place 2 inches from edges.

LABORATORY EXERCISE 3

BUILDING A WOODEN PLANT CONTAINER - TOOL-BOX PLANTER

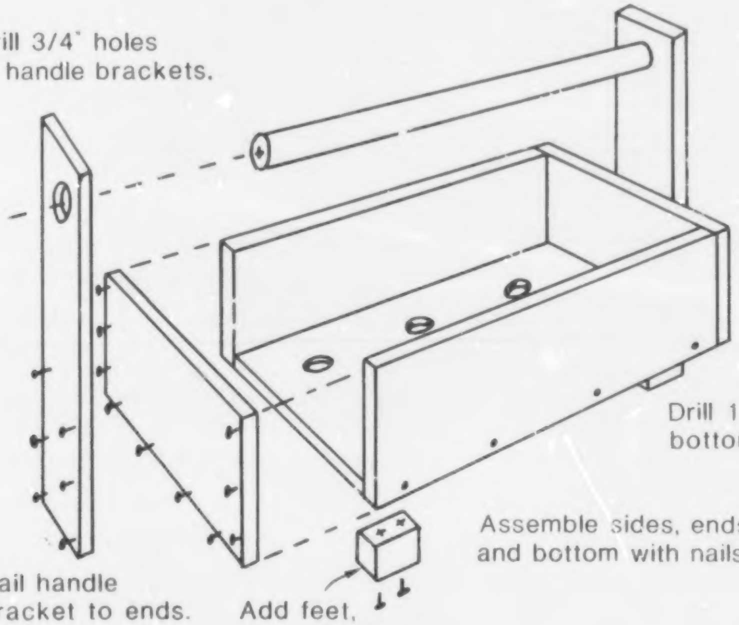
PURPOSE: The purpose of this laboratory exercise is to build a wooden planter suitable for container gardening.

MATERIALS:

1. Finished redwood (rot-resistant and heart grade):
    - a. 2 sides: 1" x 4" x 18"
    - b. 2 ends: 1" x 4" x 12"
    - c. 2 handle brackets: 1" x 2½" x 15½"
    - d. 4 feet: 2" x 2" x 3"
2. Exterior plywood:
    - a. 1 bottom: ½" x 10½" x 16½"
3. 1 handle : 3/4" hardwood dowel, 22" long
4. Galvanized box nails

PROCEDURES:

1. Use the following diagram to construct the wooden planter:



Drill 3/4" holes in handle brackets.

Drill 1/2" holes in bottom for drainage.

Assemble sides, ends, and bottom with nails.

Nail handle bracket to ends.

Add feet, place 2 inches from edge.

LABORATORY EXERCISE 4

BUILDING A WOODEN PLANT CONTAINER - WINDOW BOX PLANTER

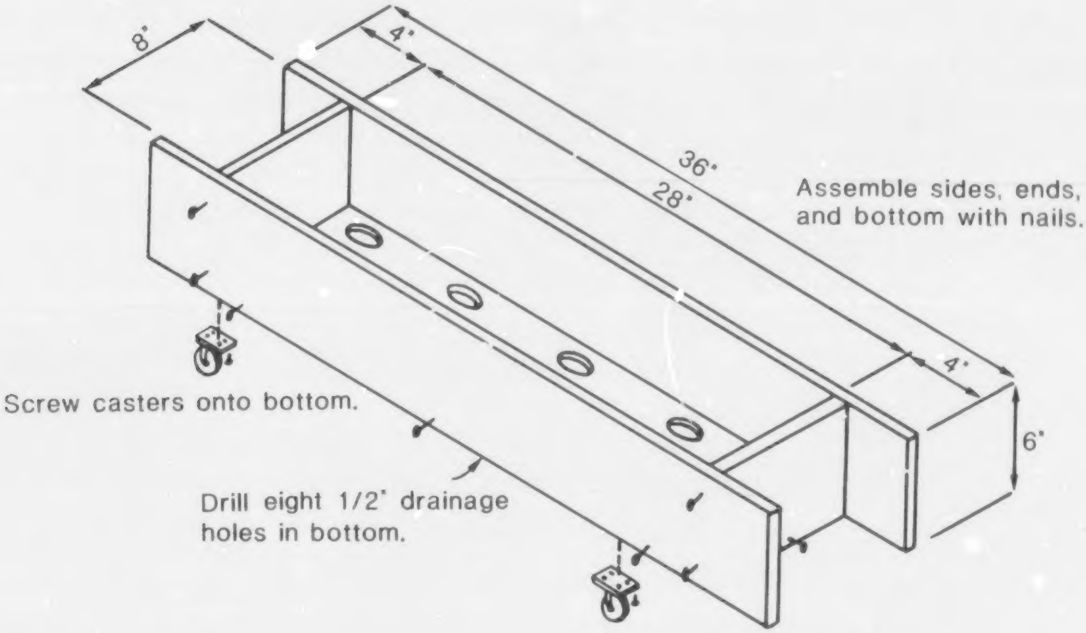
PURPOSE: The purpose of this laboratory exercise is to build a wooden planter suitable for container gardening.

MATERIALS:

1. Rough redwood (rot-resistant and heart grade).
    a. 2 sides: 1" x 6" x 36"
    b. 2 ends: 1" x 6" x 8"
2. Exterior plywood
    a. 1 bottom: 1" x 8" x 28"
3. 4 wood screws
4. Galvanized box nails
5. 4 heavy duty casters

PROCEDURES:

1. Use the following diagram to construct the wooden planter:



Assemble sides, ends, and bottom with nails.

Screw casters onto bottom.

Drill eight 1/2' drainage holes in bottom.

LABORATORY EXERCISE 5

BUILDING A WOODEN PLANT CONTAINER - ROOTING BOX

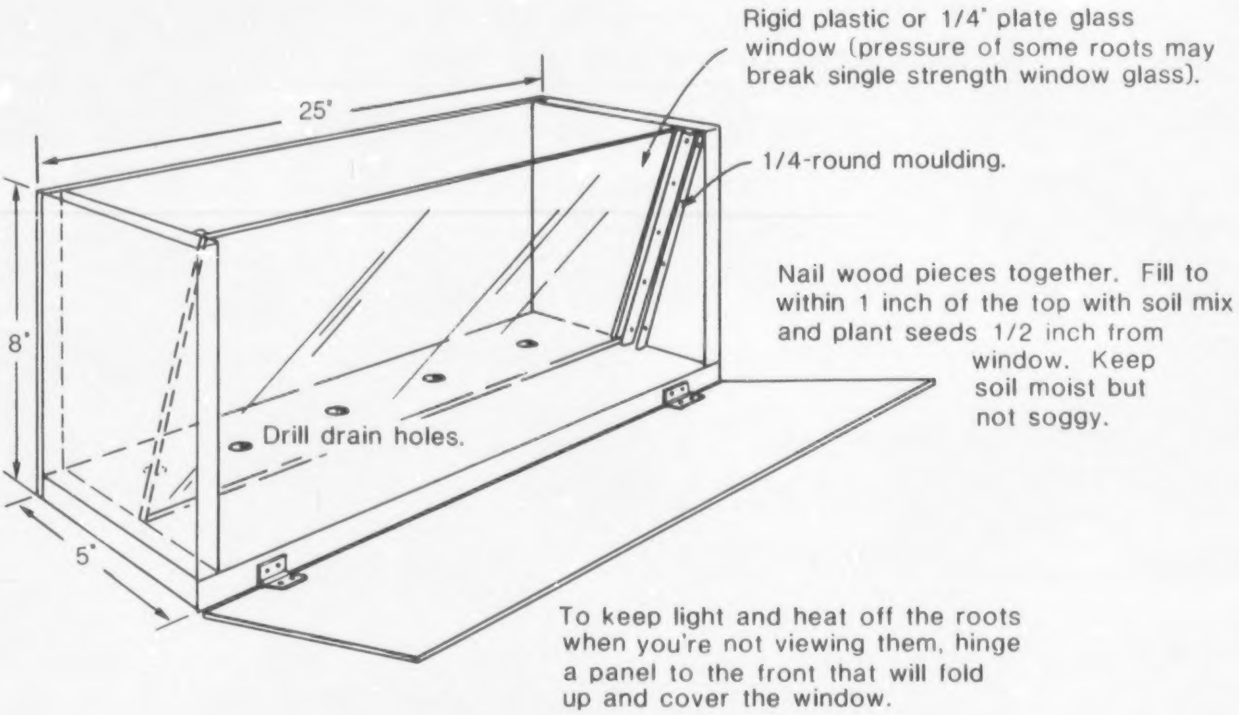
PURPOSE: The purpose of this laboratory exercise is to build a rooting plant container.

MATERIALS:

1. Rough redwood (rot-resistant and heart grade):
   a. 1 back: 1" x 8" x 25"
   b. 1 bottom: 1" x 5" x 25"
   c. 1 front: 1" x 8" x 25"
   d. 2 sides: 1" x 5" x 8"
2. 1 piece rigid plastic or ¼" plate glass: 8" x 25"
3. ¼" round molding
4. 2 hinges
5. Galvanized box nails

PROCEDURES:

1. Use the following diagram to construct the root-viewing plant container:


Rigid plastic or 1/4" plate glass window (pressure of some roots may break single strength window glass).
25"
1/4-round moulding.
Nail wood pieces together. Fill to within 1 inch of the top with soil mix and plant seeds 1/2 inch from window. Keep soil moist but not soggy.
8"
Drill drain holes.
5"
To keep light and heat off the roots when you're not viewing them, hinge a panel to the front that will fold up and cover the window.

LABORATORY EXERCISE 6

GROWING BULBS IN CONTAINERS

PURPOSE: The purpose of this laboratory exercise is to plant and maintain bulbs in containers.

MATERIALS:

1. Plastic clay, or ceramic containers with drainage holes.
2. Packaged soil mix (ex., Jiffy Mix, Redi-Earth, Pro-Mix)
3. Masking tape or plant stakes
4. Waterproof labeling markers.
5. Different types of bulbs (ex., tulip, daffodil, iris, hyacinths, crocus) Note: Check with a garden center employee for the specific names of bulbs varieties suitable for container growing.

PROCEDURES:

1. Cover drainage holes with screen netting or pieces of broken pot.
2. Add a layer of soil mix so when bulbs are added, their tops are 1 inch below the rim of the container.
3. Place the bulbs in the pot, (points up, flat ends down), shoulder to shoulder. Gently firm the bulbs into the soil mix.
4. Cover the bulbs with soil mix.
5. Water thoroughly by placing the container in a pan of water and letting it soak until the surface of the soil feels moist. Drain excess water.
6. Using the waterproof marker, label each container with masking tape or a plant stake. Include the name of the bulb, flower color, dates for cold storage, and anticipated blooming dates.
7. Place containers where they can get 12 to 14 weeks of 40-50°F temperatures. Do not place containers where they can freeze.
8. Keep the soil mix moist - not wet - during the storage period.
9. At the end of the cold storage period, sprouts should be 2 to 5 inches high and roots should be seen at the drainage hole. Place the containers in a 60°F, well-lighted area.

10. After 1 to 2 weeks the containers are ready to be placed in normal room temperatures.

11. After blooming, do not remove the leaves until they have withered and turned brown.

12. Plant the bulbs in the ground in the fall or discard them.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

GROWING PLANTS IN CONTAINERS

SHORT ANSWER:

1. List three types of annuals suitable for a container garden in full sun.

    a. Geranium
    b. Petunia
    c. Portulca

2. Why are soilless planting mixes recommended for container gardens?

    Soilless planting mixes are lightweight, sterile, and contain plant nutrients.

3. Why may plants growing in clay pots need watered more frequently than plants growing in plastic containers?

    Clay pots are porous and soil moisture evaporates through the container walls.

4. Why should wooden plant containers have adequate air space beneath them?

    When wooden containers are in direct contact with a moist surface they attract pests, such as slugs and earwigs, and the wood tends to rot.

5. List three factors that can effect the frequency of watering.

    a. level of light
    b. type of container
    c. temperature level

6. Describe how to root prune a pot-bound plant prior to transplanting into a container.

    Make 4 to 5 cuts from top to bottom, down the side of the root ball. Fray the roots to increase the formation of new-roots.

7. Identify three types of deciduous trees suitable for growing in containers.

    a. Japanese Maple
    b. Eastern Redbud
    c. Flowering Crabapple

8. Identify three types of shrubs that can be grown in containers.

    a. Korean Boxwood
    b. Mugho Pine
    c. Blue Pfitzer Juniper

UNIT M: Retail Floriculture

PROBLEM AREAS:

1. Designing silk and dried arrangements
2. Designing wedding arrangements
3. Designing funeral arrangements
4. Designing holiday arrangements
5. Designing dish gardens and terrrariums
6. Operating a retail flower shop

UNIT M

UNIT M: RETAIL FLORICULTURE

PROBLEM AREA: DESIGNING SILK AND DRIED ARRANGEMENTS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended time for teaching this problem area is during the late spring or early fall.

The estimated instructional time for this problem area is 8 to 10 days depending on how far the teacher wishes to go in developing specialized floral design skills. If the students are to be involved in other activity exercises, the instructional time will need to be increased. The instructor is encouraged to use the detailed information sheets to plan and conduct laboratory exercises.

Instructors are encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets, student worksheets, laboratory exercise, and test questions were developed by Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois and reviewed by Paul E. Hemp, Janet L. Henderson, and Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Retail floriculture

II. Problem area: Designing silk and dried arrangements

III. Objectives: At the close of this problem area, students will be able to:

1. Name and identify plant materials suitable for drying.
2. Identify the various methods for collecting and drying different types of plant materials.
3. Demonstrate correct wiring techniques for silk and dried flowers.
4. List the types of containers and foams used for silk and dried arrangements.
5. Identify the methods for dying artificial flowers.
6. Design silk and dried materials into arrangements.
7. Demonstrate proper handling and care of artificial flowers.

IV. Suggested interest approaches:

1. Show students a fresh flower arrangement after one week compared to an artificial arrangement. Discuss the advantages of using artificial flowers.
2. Show students several common weeds and grasses that have been dried, and show how they can be used to make an inexpensive arrangement.
3. Have students collect a variety of plant materials and experiment with different ways of drying them.
4. Display a silk arrangement and a fresh arrangement in front of the class and see if the students can tell the difference.

V. Anticipated problems and concerns of students:

1. What are the advantages and disadvantages of using artificial flowers?
2. Where can I use artificial flowers?
3. Which flowers can I dry?
4. What are the different methods I can use to dry flowers?
5. Where can I collect materials for drying?
6. What time of year is best to collect materials for drying?

7. Why are different methods used to dry different types of flowers?

8. What special mechanics do I need to use for artificial arrangements?

9. What types of containers can I use for artificial arrangements?

10. How do I support the flowers in the container?

11. How do I design artificial flowers into an arrangement?

12. How can I change or improve the color of dried materials?

13. How do I care for silk and dried arrangements?

14. How do I handle an artificial arrangement to prevent damage during delivery?

VI. Suggested learning activities and experiences:

1. Visit a flower shop and note the wiring, picking, and arranging techniques used. Also, check the types of silk and dried flowers available there.

2. Have students collect 8-10 samples of flowers and foliages from fields, woods, and roadsides. Dry the plant materials using the hanging and pressing methods described on Information Sheet 2 - Methods of Drying Flowers and Foliage. Complete Student Worksheet 1 - Effectiveness of the Hanging and Pressing Methods for Drying Selected Plant Materials.

3. Divide students into 4 groups and assign each group a different medium from those listed on Laboratory Exercise 1 - Drying Flowers with a Medium. Have each group dry 4-5 types of flowers using this method. Compare the results each group obtained using the different mediums.

4. Wire and tape 4-6 silk flowers following the steps on Information Sheet 4 - Candle Method of Wiring Silk Flowers. Use the wired silk flowers to practice making a corsage or boutonniere.

5. Practice wiring, picking, and taping stems on to different types of dried flowers. Form the flowers into clusters and spikes following the steps listed on Information Sheet 3 - Wiring and Taping Artificial Flowers into Clusters and Spikes.

6. Display samples of dried flowers and foliages in the classroom. Label each one for students to study and memorize the names. Suggested flowers and foliages are listed on Information Sheet 1 - Common Dried Plant Materials.

7. Show slides of different dried materials and arrangements in order to:

   a. distinguish between line, form, focal, and filler flowers.

   b. offer ideas for creative dried arrangements.

8. Have students bring their own containers to class. Display and discuss the variety of containers. Have the students devise their own holding mechanisms inside the containers.

9. Have the students make dried flower arrangements using the containers they have prepared, and the flowers they have dried. Then, have the students critique each other's arrangements according to the design principles used.

10. Practice dying dried flowers following the methods listed on Information Sheet 6 - Methods of Dying Artificial Flowers.

11. Have students select a location in their home and complete Student Worksheet 2 - Custom Designing a Flower Arrangement. Then, have students make a silk arrangement based on the information gathered on the worksheet.

12. Have a florist come to class and demonstrate the use of a picking machine for dried flower arranging.

VII. Application procedures:

1. Techniques learned in designing artificial arrangements will aid students working for retail florists.

2. Inexpensive artificial arrangements can be designed for FFA/SOE sales by using flowers the students have dried themselves.

3. Skills learned in preparing and designing artificial flowers can be used for decorating at home.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Administer a practical exam on the identification of dried plant materials using slides and/or actual plant materials.

3. Evaluate laboratory exercises and worksheets.

IX. References and aids:

1. Culbert, John R. Dried Plant Materials, Horticulture Facts #FL-15-83, Cooperative Extension Service, University of Illinois at Urbana-Champaign, College of Agriculture.

2. Ohio Agricultural Education Curriculum Materials Service, Room 254, 2120 Fyffe Road, Columbus, Ohio 43210.

   A. *Dried Materials* - AgDex 200/88 (slide set)

3. Condon, Geneal. *The Complete Book of Flower Preservation*. Prentice-Hall International, Inc., London, 1970.

4. Carico, Nita Cox and Jane Calvert Gwynn. *The Dried - Flower Book*. Doubleday and Company, Inc., Garden City, New York, 1962.

5. Foster, Maureen. *Preserved Flowers, Practical Methods and Creative Uses*, Pelham Books Ltd., London, 1973.

6. *Everlasting Flowers*. Macmillan Publishing Co., Inc., New York, 1976.

INFORMATION SHEET 1

COMMON DRIED PLANT MATERIALS

Focal Materials

Artichoke
Indian Corn
Lotus Pod
Milkweed Pod
Protea
Strawberry Pop Corn

Form Materials

Artichoke Flower
Cordonne Puffs
Japanese Lantern
Strawflower
Teasel
Yarrow

Line Materials

Asparagus
Bamboo
Cattails
Driftwood
Eucalyptus
Ornamental Grass
Sea Oats
Wild Oats
Salvia
Wheat

Filler Materials

Baby's Breath
Bittersweet
Bunny Tails
Leatherleaf Fern
Magnolia
Money Plant
Oak Leaves
Palmetto
Star Flower
Statice

INFORMATION SHEET 2

METHODS OF DRYING FLOWERS AND FOLIAGE

For best results during drying, flowers should be picked at their prime, and with the brightest color. Picking should be done on a warm, dry day when there is minimal moisture on the flower surface. After picking, remove all the leaves and all but one inch of stem. Insert a florist's wire into the stem. This wire will become secure during the drying process. Now the flower is ready to be dried. The drying method used for each flower depends on the shape and thickness of the flower. The best way to determine the most effective method for a particular flower is to experiment.

Hanging Method

This method is best for flowers that wilt very little, such as Baby's Breath, Yarrow, and Statice.

1. Tie several stems together tightly in an uncrowded bunch. Large flowers can be hung individually.
2. Hang flowers upside down in a dry, dark, ventilated place.
3. Flowers will take 2-3 weeks to dry thoroughly.

Pressing Method

This method is best for foliage and thin, flat petaled flowers, such as Pansies, Violets, and Buttercups.

A flower press can be made with several layers of newspaper or paper towels between 2 flat boards, or a large book.

1. Lay the flowers out flat with newspaper or paper towels between the layers.
2. Weight down the top.
3. Allow the flowers to dry for several weeks in a warm, dry, well-ventilated place.
4. Check the flowers often, and change the paper between the layers to prevent mold.

Quick pressing - Cover the flowers or foliage with waxed paper and a light cloth. Press with a warm iron.

Glycerin Method

This method is best for foliage and branches with many leaves, such as Eucalyptus, Oak Branches, and Magnolia Branches.

glycerin solution- 1 part glycerin
2-3 parts hot water
2 tablespoons bleach

1. Split the bottom 2 inches of the stem. Crush heavy stems with a hammer.

2. Place stems into about 6 inches of glycerin solution.

3. Keep the stems in solution until they are full of glycerin.

Note: Glycerinized leaves usually become darker during the preserving process. To prevent this darkening, absorption dyes can be added to the glycerin solution, thus retaining the leaf's green color.

Drying with a Medium

This method is best for flowers that wilt readily, have open forms, or have thick deep shapes, such as Lilies, Snapdragons, and Peonies.

Medium 1
sand
(drying time = 2-3 wks)

Medium 2
Silica Gel
(drying time = 3-7 days)

Medium 3
2 parts Borax
1 part sand, perlite,
or cornmeal
3 tablespoons uniodized
salt per quart
(drying time = 1-2 wks)

Medium 4
2 parts cornmeal
1 part laundry
detergent
(drying time = 3-7 days)

1. Add wire stems to flowers and tape them with florist's tape.

2. Cover the bottom of a deep container with ½-1 inch of the drying medium.

3. Lay flat flowers over this layer facing downwards, cup flowers facing upwards.

4. Sift additional media into and around the flowers until they are completely covered with a ¼ inch layer.

5. Store the container in a warm, dry place until the flowers are dry. (Containers with silica gel must be tightly sealed during the drying process).

6. When dry, carefully remove the flowers and dust off the media with a camel-hair brush.

Microwave Method

This method is best for flowers with many petals and deep forms, such as Carnations and Roses.

1. Pour ½-1 inch of drying medium into a glass container.

2. Leave 1 inch of stem on the flower. Do not add wire stems.

3. Place flowers into the medium facing upwards, and cover with ½ inch of additional media.

4. Place the container next to a cup of water in the microwave. Heat for 1-3 minutes for thin flowers, 5-8 minutes for thick, fleshy flowers. (A regular oven can be used in the same way at 150-180°F for 8-24 hours.)

5. After heating, flowers should remain in the medium for 1-24 hours.

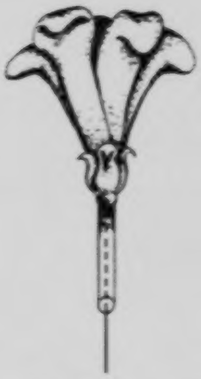
6. Remove flowers, brush off media, add a wire stem, and tape.

Note: Red, pink, and blue flowers tend to change colors when dried by this method. Experimenting with one or two flowers before drying an entire group is recommended.

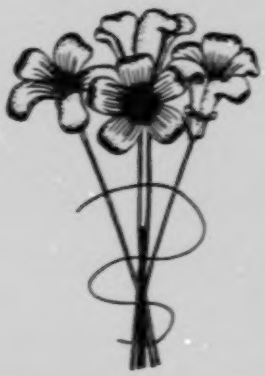
WIRING AND TAPING ARTIFICAL FLOWERS INTO CLUSTERS AND SPIKES

CLUSTER

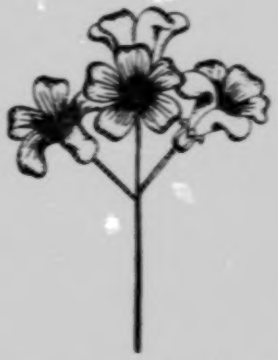
1. WIRE FLOWERS BY INSERTION INTO THE HOLLOW OF THE STEM.



2. GATHER FLOWERS INTO A CLUSTER AND BIND ALL STEMS TIGHTLY WITH THIN COPPER WIRE.

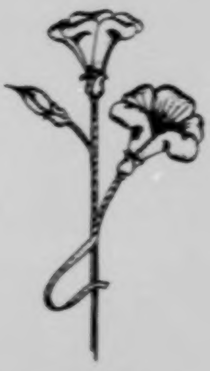


3. TO COMPLETE THE CLUSTER, WORK ALL AROUND, BENDING EACH FLOWER OUTWARDS.

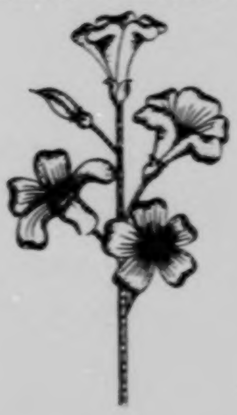


SPIKE

1. USING PROPERLY WIRED AND TAPED FLOWERS, CREATE A SPIKE BY TAPING THE STEMS TOGETHER AT DIFFERENT LENGTHS TO FORM A SINGLE STALK.



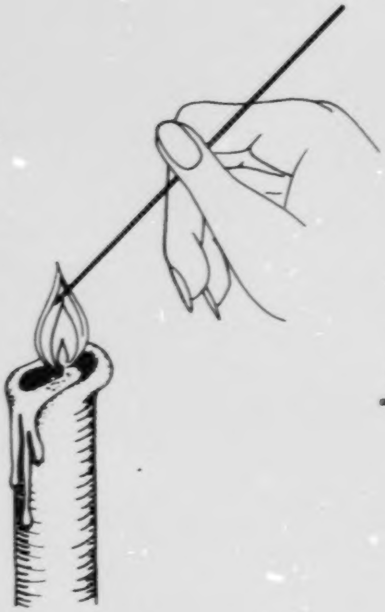
2. CONTINUE ADDING FLOWERS UNTIL THE SPIKE REACHES THE DESIRED LENGTH.



CANDLE METHOD OF WIRING SILK FLOWERS

1. HEAT THE TIP OF THE FLORIST WIRE IN THE FLAME OF A CANDLE UNTIL GLOWING.
2. INSERT THE HOT TIP THROUGH THE PLASTIC CALYX OF THE FLOWER USING THE PIERCE WIRING METHOD.
3. BEND THE ENDS OF THE WIRE DOWN FROM THE CALYX.
4. TAPE THE CALYX AND WIRES TOGETHER TO FORM A SMOOTH STEM.

1.



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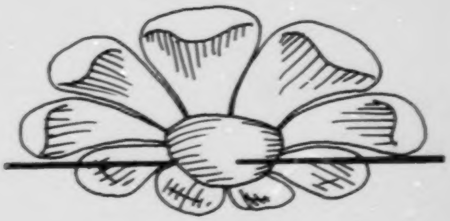

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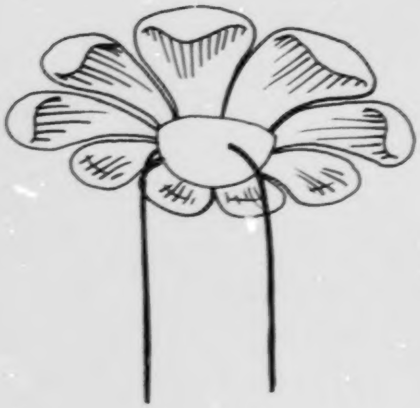

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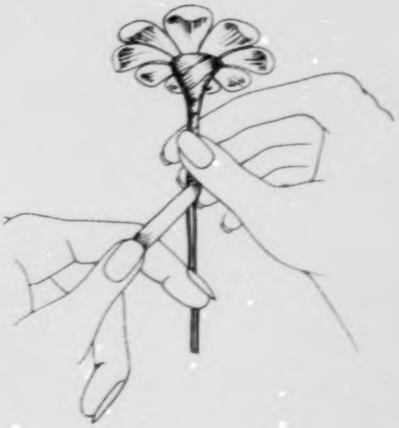


INFORMATION SHEET 5

CONTAINERS AND HOLDERS FOR ARTIFICIAL ARRANGEMENTS

Because artificial arrangements do not need water, virtually any container can be used. When choosing a container keep in mind the size, style, and color the arrangement will be. Generally, dried flower arrangements look best in rustic or natural containers. Silk flowers have a more elegant appearance, and thus look best in glass or ceramic containers. However, these are not strict rules, and under the right circumstances any number of containers may be used.

Suggested containers:

bird's nests

cork bark

driftwood

gourds

tree trunk sections

cornucopia

tin boxes

Japanese rice bowls

leaded glass boxes

brass vases

baskets

enclosed glass bells

There are a number of holding mechanisms available to support artificial flowers in the container. The most commonly used mechanism is dry florist's foam (Sahara) which is available in several grades for heavy or light weight stems. When possible, brown foam should be used with dried arrangements so the foam will be less conspicuous. The foam can be secured in the container with hot glue, sticky adhesives (Cling), or tape across the top. Also, the edges of the foam should be bevelled to give more useful surface area for arranging. Other possible holding mechanisms include Styrofoam, liquid glue saturated foams, clay, vermiculite, and pin holders.

INFORMATION SHEET 6

METHODS OF DYING ARTIFICIAL FLOWERS

Dried flowers may be dyed when the flower color has faded or the flower is not the desired tint or shade. However, too much dying gives a very unnatural appearance to the flowers, and thus should be used sparingly.

Florist's Aerosol Spray

1. Hold the plant material 12-18 inches away from the can.
2. Spray the plant material using short bursts rather than one continuous spray to avoid blotchy areas.
3. The darkness of the color can be controlled by the amount of spraying and the distance of the spray from the plant material.
4. Allow the spray to dry before arranging.

Liquid Dye

The liquid dye method is best for flowers that will be dried using the hanging method. Florist's dye, fabric dye, or food coloring may be used for this method.

1. Use fresh flowers that are ready to be dried.
2. Prepare the dye using very hot water.
3. Dip the flowers in the dye bath long enough to achieve the desired color.
4. Let the excess dye drip back into the container. Shake the flower if necessary.
5. Place the flower stems in cold water while the dye is drying.
6. Dry the flowers according to the appropriate method.

Chalk

1. Flower petals must be completely dry before chalk can be applied.
2. Drop the flower into a plastic bag of grated chalk and shake the bag until all petals are colored.
   Or, hold the flower over a sheet of plastic and sift chalk onto it with a tea strainer.
3. Remove the flower and brush the petals with a camel-hair brush to remove the excess chalk.

4. Sift several handfuls of sand over and through the petals and then tap the stem to remove all excess chalk and sand.

5. Dry the flower according to the appropriate method.

Note: To avoid coloring the centers of daisy-type flowers, brush the chalk onto the petals only. Use a clean brush to remove any excess chalk.

INFORMATION SHEET 7

PICKING METHODS FOR ARTIFICIAL FLOWERS

1. Natural Picking -

   This method is the easiest and should be used whenever possible. Simply insert the natural stems of the flowers into the foam material. Natural picking is used almost entirely for flowers dried by the hanging method, since the natural stems remain on these flowers during drying.

2. Wire Picking -

   Many flowers are dried with an artificial wire stem, and most silk flowers are made with a heavy wire stem attached. These wire stems can be inserted into the foam material as if they were the natural flower stems. Wire stems are usually very stiff and straight and do not have a very natural appearance. These stems should be taped with green or brown tape and curved enough to make them look more realistic.

3. Wood Picking -

   Thin wire stems that are inserted into the foam material are often unstable or become unstable as the arrangement is moved about. Wooden picks are used in these situations to give the stems a more stable foundation. They may also be used to lengthen short stems as needed. Square picks with a pointed base and a wrapping wire at the top should be used. Simply wire the stem onto the pick with the wrapping wire and tape them together at the joining point.

4. Steel Picking -

   Steel picks are often used in the flower shop to speed up the wiring and taping of artificial flowers. These picks are attached to the flowers with a picking machine, and the sharp picks are then inserted into the foam material.

Artificial arrangements can be made permanent and more stable by dipping any of the above picks into hot melted glue before insertion into the foam material.

INFORMATION SHEET 8

CARE AND HANDLING OF ARTIFICIAL ARRANGEMENTS

Dried flower arrangements should be displayed in a place that is free from drafts and dampness and is not in direct sunlight. Dried arrangements should be dusted regularly with a feather or camel-hair brush. If the arrangement develops a worn out appearance it can be freshened up by replacing any faded or broken flowers in it.

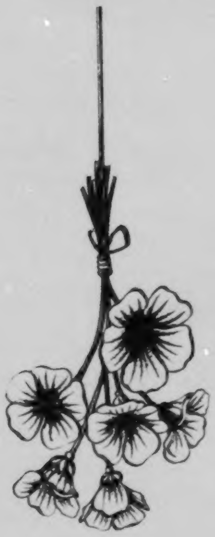
Silk flowers should be displayed in a place that is free from direct sunlight to avoid fading. Dust can be removed from silk flowers by shaking them inside a paper bag with a few teaspoons of salt.

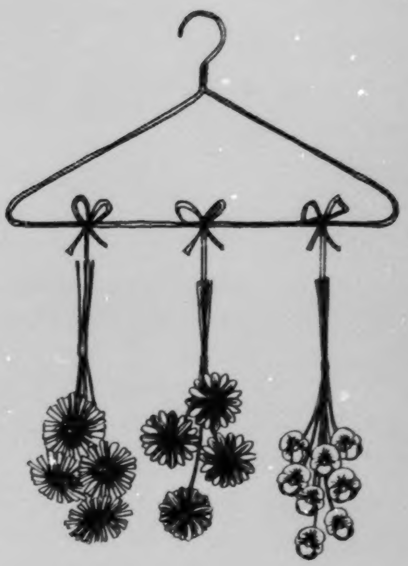
Artificial arrangements should be transported inside strong cardboard cartons that are at least as tall, and a little wider than the arrangement. Newspaper or tissue paper can be stuffed around the container for support, or clay can be attached to the base of the container and pressed down inside the box. Avoid packing over four arrangements in a single box, and give each arrangement plenty of room inside the box.

INFORMATION SHEET 9

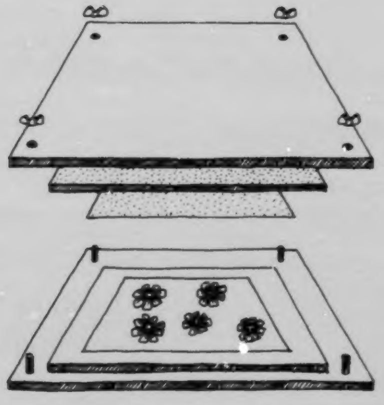
METHODS OF DRYING PLANT MATERIALS

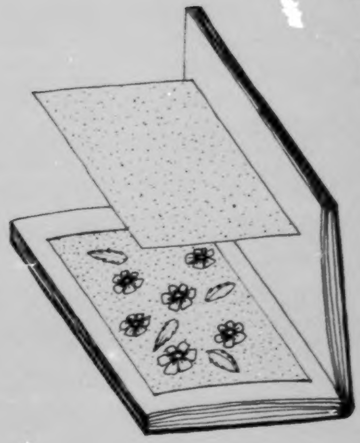
1. HANGING METHOD

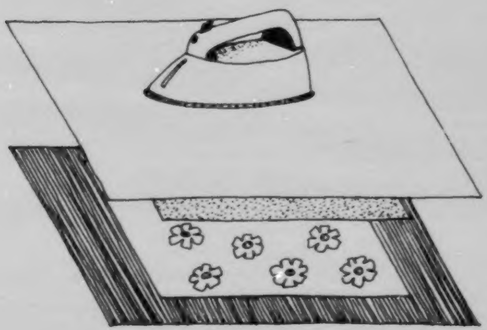




2. PRESSING METHOD

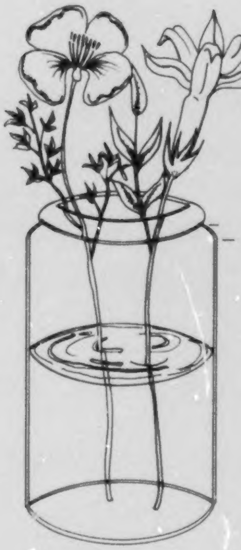




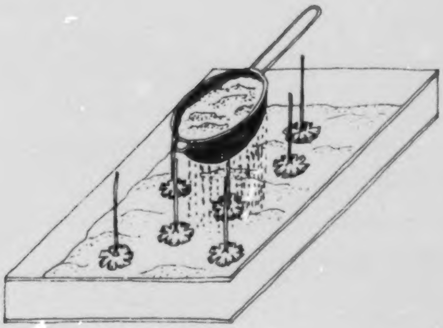


METHODS OF DRYING PLANT MATERIALS

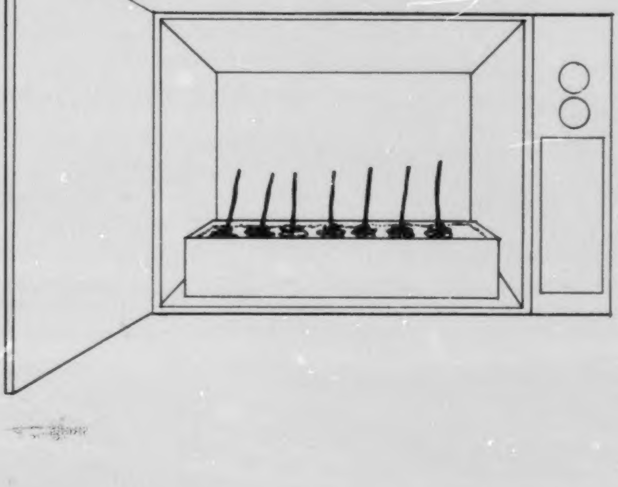
3. GLYCERIN METHOD



4. DRYING WITH A MEDIUM



5. MICROWAVE METHOD



STUDENT WORKSHEET 1

EFFECTIVENESS OF THE HANGING AND PRESSING METHODS OF DRYING SELECTED PLANT MATERIALS

PROCEDURE: List the various plant materials dried, the amount of time required for each method, and the resulting quality of the dried flowers for each method.

Plant material	Drying Time (days)		Dried Flower Quality	
	Hanging	Pressing	Hanging	Pressing
Example: Wheat	15	18	good; retained desired color and shape	fair; some broken and disfigured pieces
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

STUDENT WORKSHEET 2

CUSTOM DESIGNING A FLOWER ARRANGEMENT

SITUATION: Select a location in your home that would be enhanced by a permanent flower arrangement. Complete the following questions about your chosen location.

1. What room will the arrangement be displayed in?____________________

2. Where will the arrangement be located within the room? (coffee table, nightstand, shelf, etc.)__________________________

3. What color(s) is the room?____________________________________

4. What style is predominant in the room? (Early American, Victorian, Contemporary, etc.)_____________________________

5. Approximately how much space is available for the arrangement? ___________________________

6. Will the arrangement be seen from one side or all sides?_____________

DESIGN PLANS: Based on the information collected above formulate a specific design for the arrangement. Completion of the following statements will help guide your design.

1. The dominant color of my arrangement will be______________________.

2. The accent color(s) of my arrangement will be______________________.

3. The style of my arrangement will be:

   a. simple/subdued.
   b. elaborate/bold.

4. My arrangement will be:

   a. one-sided.
   b. all-around.

5. The height of my arrangement will be:

   a. low - less than 10 inches.
   b. medium - 10 to 20 inches.
   c. high - over 20 inches.

6. The width of my arrangement will be:

   a. narrow - less than 8 inches.
   b. medium - 8 to 14 inches.
   c. wide - over 14 inches.

7. The shape of my arrangement will be:

   a. round.
   b. oval.
   c. symmetrical triangle.
   d. asymmetrical triangle.
   e. other (describe below)

ADDITIONAL COMMENTS AND PLANS:

LABORATORY EXERCISE 1

DRYING FLOWERS WITH A MEDIUM

PURPOSE: Students will use one of the mediums listed below to dry different types of flowers and to compare the results obtained from each of the four mediums.

MATERIALS:

1. one of the mediums listed below
2. large, deep container
3. florist's wire
4. florist's tape
5. 4-5 types of fresh flowers
6. camel-hair brush

Medium 1	Medium 2	Medium 3	Medium 4
sand	silica gel	2 parts Borax 1 part sand, perlite, or cornmeal 3 tablespoons uniodized salt per quart	2 parts cornmeal 1 part laundry detergent

PROCEDURES:

1. Prepare the assigned medium.

2. Remove all but one inch of stem from the flowers, and insert a wire into the stem. Tape the wire and stem together with florist's tape.

3. Cover the bottom of the container with ½-1 inch of the medium.

4. Lay flat flowers over this layer facing downwards, cup flowers facing upwards.

5. Sift additional media into and around the flowers until they are completely covered with a ¼ inch layer.

6. Store the container in a warm, dry place until the flowers are dry. (If using the silica gel medium, the container must be stored air-tight.)

7. When dry, carefully remove the flowers and dust off the medium with a camel-hair brush.

OBSERVATIONS:

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

DESIGNING SILK AND DRIED ARRANGEMENTS

SHORT ANSWER:

1. Name 2 form flowers and 2 line flowers suitable for drying.

a. Form flowers	B. Line flowers
1. Strawflower	1. Cattails
2. Yarrow	2. Wheat

2. Name 2 methods for preserving foliage.

   a. Pressing
   b. Glycerin

3. Choose 2 drying methods and briefly describe each one.

   a. Hanging method. Tie flowers into bunches and hang them upside down in a dry, dark, well-ventilated location.

   b. Drying with a medium. Prepare medium and sift over prepared flowers until covered. Store the container in a warm dry place until the flowers are dry.

4. How can silk flowers without stems be wired?

   Heat the tip of the wire in a candle and pierce it through the plastic calyx. Bend both of the wires down and tape them.

5. Name 3 holding mechanisms used to support artificial arrangements.

   a. Styrofoam
   b. Sahara
   c. Vermiculite

6. Briefly explain the 2 most common methods of dying dried flowers.

   a. Florist's aerosol spray. Spray the flower heads directly with short bursts at a distance of 12-18 inches from the flower.

   b. Liquid Dye. Prepare the dye with hot water. Dip the fresh flowers into the dye, allow it to dry on the petals, then dry the flower appropriately.

7. Name the 4 methods of picking artificial flowers.

   a. Natural picking
   b. Wire picking
   c. Wood picking
   d. Steel picking

8. How can dust be removed from silk flowers?

Put the silk flowers inside a paper bag with some salt and shake it up.

TRUE OR FALSE:

True 1. When drying flowers with silica gel, the container should be stored air-tight.

True 2. Dried flowers can be dyed with food coloring or chalk.

False 3. Protea is a filler flower.

True 4. Laundry detergent can be used to dry flowers.

False 5. The hanging method of drying flowers is best for flowers that wilt very quickly.

False 6. Drying flowers with the sand method takes about 2-3 days.

True 7. Artificial flowers can be glued into the foam to make the arrangement permanent.

UNIT M: RETAIL FLORICULTURE

PROBLEM AREA: DESIGNING WEDDING ARRANGEMENTS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended time for teaching this problem area is folowing an introductory unit on basic floral design techniques.

The estimated instructional time for this problem area is 7 to 14 days depending on how far the teacher wishes to go in developing wedding design skills. If the students are to be involved in other activities, the instructional time will need to be increased. The instructor is encouraged to refer to Metropolitan Core Curriculum III - Unit M, Problem Area: Making Arrangements, Corsages, and Nosegays to review basic floral design principles.

Instructors are encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets student worksheets, laboratory exercises, transparency discussion guide, and test questions were developed by Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois and reviewed by Paul E. Hemp, Janet L. Henderson and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Retail floriculture

II. Problem area: Designing wedding arrangements

III. Objectives: At the close of this problem area, students will be able to:

1. Identify different types of wedding arrangements and decorations.
2. Conduct a wedding interview and properly take a wedding order.
3. Design and assemble different types of wedding arrangements and decorations.
4. Calculate a wholesale flower order from a retail wedding order.

IV. Suggested interest approaches:

1. Invite a local florist to the class to give tips on:
   a. taking a wedding order
   b. installing ceremony and reception decorations
   c. wiring specialty flowers, such as stephanotis and phaelenopsis orchids.
2. Bring in a wedding announcement page from the local newspaper, and ask the following lead questions:
   a. What are some of the differences between the weddings described in the announcements?
   b. What does a florist need to know in order to accept a wedding order?
3. Ask the students to describe the flowers and decorations they saw while attending the weddings of friends and relatives.
4. Conduct a role-play in which one student acts as a bride and another student acts as a florist taking the wedding order.

V. Anticipated problems and concerns of students:

1. What are the different types of bride's bouquets?
2. What types of floral decorations are used for the wedding ceremony?
3. What types of floral decorations are used for the wedding reception?

4. How do I conduct a wedding interview?

5. What information is needed on a wedding order?

6. How do I construct a bride's bouquet?

7. How do I construct ceremony decorations?

8. How do I decorate a cake with flowers?

9. How do I place an order to the wholesale florist after receiving a wedding order?

10. How do I install flowers in a church, synagogue, and/or reception area?

VI. Suggested learning activities and experiences:

1. Have the students visit a local florist shop and view various slides, pictures, and catalogues used to identify different types of wedding arrangements.

2. Have the students develop a bulletin board displaying the different types of wedding bouquets and decorations. Trade journals and bridal magazines are possible sources of pictures and information.

3. Attend a local bridal show and record the different styles of bouquets and the types of flowers used (Shows are usually sponsored by large department stores or shopping malls).

4. Show the slide set Making Silk Wedding Bouquets, available from The Ohio Agricultural Education Curriculum Materials Service.

5. Arrange for students to visit local churches, synagogues, hotels, and reception halls to learn customary procedures and regulations for weddings. Have each student or group of students give an oral report of their findings to the class.

6. Have each student prepare a notebook containing ideas and pictures for indoor, outdoor, and home weddings using bridal magazines and trade journals as resources.

7. Have a local florist come to the class and demonstrate the construction of unique wedding pieces such as a baby's breath halo or a Bible bridal bouquet.

8. Conduct a classroom discussion on how to handle a wedding order. Encourage students to identify the necessary steps in completing a wedding order. Use Information Sheet 1 to guide the discussion.

9. Discuss with students the different types of religious customs associated with weddings. Use Information Sheet 2 to guide the classroom discussion.

10. Hold a mock wedding at the school or local church/synagogue. Ideas and guidelines for this activity are outlined in Information Sheet 3.

11. Invite an official from the fire department to discuss fire safety in public buildings pertaining to wedding and reception decorations. Use Information Sheet 4 to review fire safety regulations.

12. Using Student Worksheet 2, have students practice conducting wedding interviews with each other. Have the students calculate the wholesale order to be placed from their wedding order using Student Worksheet 3.

13. Have students practice wiring speciality flowers following the procedures outlined in Laboratory Exercise 1.

14. Construct pew decorations using Laboratory Exercise 2.

15. Construct an arm bridal bouquet using Laboratory Exercise 3.

16. Construct a cascade bridal bouquet using Laboratory Exercise 4.

17. Construct a flowergirl's basket and ringbearer's pillow using Laboratory Exercise 5.

18. Have the students critique each wedding bouquet they construct, using Student Worksheet 1.

19. Ask students to identify the different types of decorations used in wedding ceremonies and receptions. Generate a list on the board. Use Student Worksheet 2 to review the types of floral pieces typically ordered for weddings.

VII. Application procedures:

1. Skills learned in this problem area may be applied by making arrangements and decorations for school functions.

2. The knowledge and skills learned in this problem area will enhance the students' employability in the floral industry.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate worksheets, oral reports, and notebooks.

3. Evaluate laboratory exercises.

4. Prepare and administer a practical exam on the construction of wedding bouquets and decorations.

IX. References and aids:

1. Ohio Agricultural Education Curriculum Materials Service, Room 254, 2120 Fyffe Road, Columbus Ohio, 43210.

    a. Making Silk Wedding Bouquets (Slides)

2. Gerding, Mildred F. Retail Floristry Sales and Merchandising. Instructional Materials Center, The University of Texas at Austin 1976.

3. Sidles, Constance, J. "Pray Tell Me the Rules", Flowers & Volume 4/#3, Special Bridal Issue, March 1983.

4. Pfahl, Peter B. The Retail Florist Business, 4th ed. Danville, Illinois. The Interstate Printers and Publishers, Inc., 1983.

INFORMATION SHEET 1

TIPS FOR HANDLING A WEDDING ORDER

1. Arrange a first appointment.

   *Allow an hour or more to place the initial wedding order.

   *Conduct the wedding interview in a private bridal consultation area.

   *Have available copies of bridal magazines, a wedding etiquette book, photographs or samples of wedding bouquets, ceremony and reception decorations, floor plans of various local churches, and listings of available properties for receptions.

   *Determine the date, time, and location of the ceremony and reception.

   *Obtain a complete list, the eye and hair color, height, weight, and age of all members of the wedding party.

   *Obtain a complete description of the bride's and bridesmaids' gowns. If possible, secure a material sample of the bridesmaids' dresses.

   *Obtain the home and work telephone numbers of the bride, bride's mother, and groom.

2. Contact the local wholesale florist.

   *Check the costs and availability of the flowers and foliage planned for the wedding ceremony and reception.

3. Check the church, synagogue, and, reception area

   *Determine the types of floral decorations allowed in the church or synagogue. Discuss religious policies regarding the wedding ceremony and placement of flowers.

   *Determine the size and color schemes of the reception area.

4. Arrange a second interview

   *Arrive at a firm committment on all floral pieces.

   *Review the estimated price of each floral item (e.g., altar flowers, bridal bouquet, corsages, boutonnieres, etc).

   *Quote a minimum and maximum price for each floral item.

   *Always include an "If Available" clause when discussing specific flowers and foliage.

5. Organize activities for delivering installation, and removal.

*Contact the bride several days before the wedding to determine any last minute changes.

*Obtain all necessary supplies for completing the order (e.g., ribbon, aisle runner, flower girl basket, pillow, candles, etc.).

*Establish the exact place and delivery time of all floral pieces and decorations.

*Check with the appropriate church official and reception personnel to make certain no additional activities have been scheduled for the hours before and during the delivery and installation of the floral prices.

*Provide the decorating crew with a complete description of all floral pieces, floor plans, diagrams of areas to be decorated, names of church officials and reception personnel, and a precise schedule for each activity.

*Prepare a wedding emergency kit that contains the following items: wire, floral tape, wire cutters, ribbon shears, pencil, needle and thread, straight pins, safety pins, corsage pins, fast-drying glue, extra boutonnieres, flowers, and foliage, ribbon, adhesive tape, comb, nail file, thumbtacks, candles, flashlight, and cotton balls.

*Check to make certain that all floral decorations and props are removed from the church, synagogue, and reception and that the decoration crew leaves each area clean and in perfect order.

INFORMATION SHEET 2

GUIDELINES PERTAINING TO SELECTED RELIGIOUS DENOMINATIONS

Different religious denominations have different policies and traditions regarding wedding ceremonies. The florist should become familiar with the customs of the churches and synagogues in the community. Many places of worship have wedding consultants available to assist both the florist and bride.

Four religious demoninations have been selected to provide examples of floral customs for wedding ceremonies. Have students share their own experiences regarding other religious denominations.

I. Catholic

1. Some Catholic churches have changed their traditional practices in recent years.
2. Flowers are usually not allowed on the main altar.
3. Nothing should obscure the altar from the view of the congregation.
4. Candles may be used for decorations as long as they do not interfere with the liturgical candles.
5. Some Catholic churches require that all sanctuary flowers be fresh and not silk or dried.
6. Decoration of the nave along with the sanctuary is encouraged.
7. Brides may require two bouquets. The second one is for the Virgin Mary.

II. Episcopalian

1. Episcopalian churches encourage simplicity in wedding floral decorations.
2. The altar may be decorated with flowers.
3. Altar flowers should not be taller than the standing cross, when a cross is present on the altar.
4. Pew and aisle decorations are allowed if kept simple in design.
5. Episcopalian church officials usually reserve the right to place all the decorations in the sanctuary.
6. Church officials usually recommend the props to be used.

III. Jewish

1. Few restrictions apply to wedding flowers in a Jewish ceremony.
2. Lighted candles are not permitted on the pulpit.
3. A historical tradition of a Jewish wedding is the use of a chuppah or canopy in the ceremony. Most synagogues provide a canopy, but no objection is made if a florist wishes to provide a different one from the flower shop.

IV. Lutheran

1. Most Lutheran churches are constructed in a simple Scandinavian design and prefer conservative use of ribbon and flowers.
2. Decorations around the pulpit are usually not permitted.
3. Some churches contain a special flower shelf behind the altar.

INFORMATION SHEET 3

STEPS FOR PLANNING A MOCK WEDDING

PURPOSE: The purpose of this activity is to develop the students' skills in constructing wedding bouquets and decorations. This activity will also develop students' public speaking abilities and abilities to work together in groups and committees. This activity is an excellent way to involve businesses in the community and other departments at the school in the vocational horticulture program.

1. Have each student in the class portray a member of the wedding party. These may include: bride, groom, maid of honor, bridesmaids, groomsmen, parents of the bride and groom, grandparents, and ushers. One or more students may wish to serve as announcers to describe the flowers and clothing of the bridal party.

2. Ask members of the class if they have any younger brothers or sisters that would like to participate as a flower girl or ring bearer.

3. Assign each member of the class to one of the following committees:

   a. Bride's & bridesmaid's dresses - visit local bridal salons to request loans of dresses to be worn at the wedding. A refundable deposit may be required.

   b. Tuxedos - visit local formal wear shops to request loans of tuxedos for the wedding.

   c. Decoration committee - visit local flower shop to request loan of candelabra and pillars.

   d. Food committee - contact the home economics department or local bakery for donation or purchase of a cake. Also plan refreshments for the reception.

   e. Publicity committee - contact the local newspaper, design a program, and contact a local printing company for donations or purchase of invitations.

   f. Music committee - plan music for the ceremony and reception. Music may be recorded or the school music department may be involved with the chorus or band.

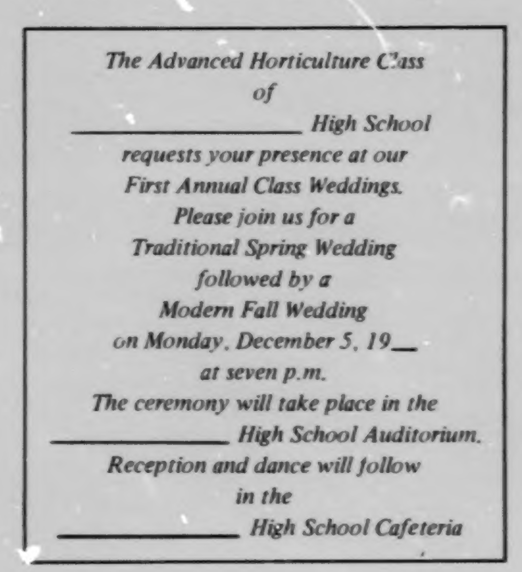
   g. Miscellaneous

      1. Location to be determined and permission secured.

      2. Make up - another area for community involvement.

    3. Lighting crew - depends on the location.
    4. Video taping crew - members of the class can watch the tape after the "wedding" and critique their project.

4. All students should participate in setting the budget under the guidance of the instructor. A small admission may be charged to cover the cost of food and flowers.
5. Students decide on the theme for the wedding, select, and construct appropriate flowers and decorations.
6. If brides' and bridesmaids' dresses are donated, the use of an aisle runner is highly recommended.
7. Rehearse the wedding processional.
8. Have each student write a small description of the clothing they are wearing and the flowers they will have for the announcers.
9. Conduct the wedding. A serious or humorous ceremony may be recited by the "priest", "rabbi", or "minister".
10. Conduct the reception. The bride may throw a bouquet and the groom a garter. The cake may be cut by the bride and groom and a small dance also may be held.
11. Assign a clean up crew.
12. Have students write thank you letters to all of the people and businesses that participated in or supported the wedding.



The Advanced Horticulture Class
of
________________ High School
requests your presence at our
First Annual Class Weddings.
Please join us for a
Traditional Spring Wedding
followed by a
Modern Fall Wedding
on Monday, December 5, 19__
at seven p.m.
The ceremony will take place in the
______________ High School Auditorium.
Reception and dance will follow
in the
______________ High School Cafeteria

Figure 1
Sample Invitation for a Mock Wedding

INFORMATION SHEET 4

FLOWERS & FIRE SAFETY REGULATIONS*

As a florist decorating a church wedding, you should be aware of the fire safety regulations that apply to public buildings and gatherings. Usually officials of the church or synagogue know what you can and cannot do when decorating their buildings. But it's still a good idea to check with the local fire department.

The regulations imposed by the fire departments across the country are generally little more than what's dictated by common sense. But specifics do vary from place to place. The regulations mentioned below are from the Uniform Fire Code, widely adopted by many municipalities. However, they are by no means universal, so it's important that you check locally - after all, you could be held responsible should a fire break out.

These suggestions should give you a good idea of what sorts of questions to ask your local fire department and what kinds of potential problems to watch out for:

1. If lighted candles are to be used in the decorations, you must have a permit from the fire department. Often, the church involved will have a general permit which will be sufficient. But if the church is not covered, you can obtain a personal permit for the event.

2. Even with a permit, you must be careful where you use lighted candles. In general, candles must be firmly secured and kept away from all possible contact with the public. This means that lighted candles may not be carried by the bride as she walks down the aisle. Instead, they must be kept in candle holders or candelabra that are placed well away from the congregation.

3. Because of the danger of their being knocked over, the use of lighted candles in aisle decorations is sometimes forbidden. Check with the authorities.

4. The use of high quality, dripless candles or mechanical/permanent candles is highly recommended.

5. Any combustible plant material used to decorate the bases of candles must be kept well away from candle flames.

6. All combustible materials used to decorate the church must be fire-retardant. Cut flowers and foliages are fine, but if you plan to use drieds or artificials extensively, you'd better check with the fire department. Also, ribbons, aisle runners, and the like must be made of fire-retardant materials.

7. Any loose-hanging decorations - such as decorations hanging from beams and overhead lamps or arrangements hanging in window sills - must be totally fire retardant. Hangings cannot be placed over or near flames.

8. Access to exits and aisles must remain open at all times. This means that you must be very careful when placing props. Free-standing candelabra and vases can be placed near doors or aisles, but they must never block free access to them.

9. Strict access regulations also apply to ribbon decorations along pew aisles. In some areas, ribbon runners along the center aisle might be permitted if they could be easily torn away in case of fire. In other regions, however, pew aisles must remain totally open, so check with your local fire department to see what applies to you.

By being fully aware of your local fire safety regulations, you can tactfully guide the bride to choose appropriate, safe decorations to make her wedding a truly joyous occasion.

*Reprinted by permission - Sidles, C.J. "Fire Safety Regulations". FLOWERS &. Vol. 4, No. 3, March, 1983, pp. 26-27.

STUDENT WORKSHEET 1

EVALUATING A COMPLETED BRIDAL BOUQUET

+ = Excellent √ = Good - = Fair O = Poor

___ 1. Does the bouquet have the proper shape?

___ 2. Does the bouquet have a strong focal point?

___ 3. Is the bouquet comfortable to hold?

___ 4. Is the bouquet lightweight?

___ 5. Was color used properly?

___ 6. Is the bouquet finished in the back?

___ 7. Is the bouquet pleasing to look at?

___ 8. Are all wires covered?

___ 9. Are all wires neatly taped?

___ 10. Are all flowers wired properly?

___ 11. Is the handle finished?

___ 12. Is the bouquet constructed securely?

___ 13. Does the bouquet contain the proper number of flowers?

___ 14. Does the bouquet contain the proper type of flowers?

STUDENT WORKSHEET 2

WEDDING ORDER FORM

BRIDE

Address

Phone

GROOM

Address

Phone

REHEARSAL DINNER

Address

Date Time

CEREMONY LOCATION

Address

Phone

Date Time

RECEPTION LOCATION

Address

Phone

Date Time

BRIDE	EXPENSE OF THE	
	Bride	Groom
Color & Style of Gown		
Style of Bouquet & Flowers		
Veil		
Going-Away Corsage		

THE BRIDAL PARTY

MAID OF HONOR

Color and Style of Gowns

Style of Bouquets & Flowers

Headpiece

BRIDESMAIDS

Color & Style of Gowns

Style of Bouquets & Flowers

Headpiece

FLOWERGIRLS

Color & Style of Gowns

Style of Bouquets & Flowers

BOUTONNIERES

Groom Ring Bearer

Best Man Grandfather

Ushers, Groomsmen Grandfather

Bride's Father Minister
Groom's Father Other

CORSAGES

Bride's Mother Dress Color Flowers
Groom's Mother Dress Color Flowers
Bride's Grandmother
Groom's Grandmother
Organist, Soloist, Hostesses, etc.
Others

DECORATIONS FOR THE CEREMONY

Main Altar
Floral Arrangements
Standing Baskets
Foliage (arrangements, rental greens, etc.)
Canopy
Aisle & Pew Decorations
Candelabra...Altar
Aisle Runner
Miscellaneous

RECEPTION

Cake & cake table		
Serving table		
Centerpieces		
Candelabra		
Other		
Sub-total		
Sales Tax		
Total		
Deposit		
Balance		

Acceptance by ______________________

Date ______________________

STUDENT WORKSHEET 3

CALCULATING A WHOLESALE FLOWER ORDER FROM A WEDDING ORDER

PROCEDURE: Using the information collected on Student Worksheet 2, complete a wholesale order indicating the flowers, foilage and supplies needed for the wedding.

Type of Flower/ Foliage	Number of Flowers needed for the wedding	# of bunches to be ordered	Cost
Example:			
1. White roses	43	2 bunches	$22.00
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			

Other materials to be ordered:

1. Example: Aisle runner - 50 ft.
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
12. ______________________________
13. ______________________________
14. ______________________________
15. ______________________________

LABORATORY EXERCISE 1

WIRING SELECTED WEDDING FLOWERS

PURPOSE: Several speciality flowers are associated with wedding work. The purpose of this laboratory exercise is to have students practice wiring techniques used for selected speciality flowers.

MATERIALS:

1. wire cutters
2. no. 18, 26, and 30 wire
3. floral tape
4. cotton balls
5. cattleya orchid
6. lilly-of-the-valley
7. phalaenopsic orchid
8. stephanotis

PROCEDURES:

I. Wiring a cattleya orchid.

1. Insert a no. 18 wire lengthwise, through the stem, into the base of the flower head.
2. Insert a no. 26 wire through the base of the flower head at right angles to the stem.
3. Bend the no. 26 wire down along the edge of the stem.
4. Wrap the stem and wires with floral tape.

II. Wiring lily-of-the-valley.

1. Floral tape a no. 30 wire.
2. Make a hook at one end of the taped wire.
3. Attach this hook around one of the top florets.
4. Carefully circle the wire down between the florets.
5. Wrap a small piece of dry cotton around the floral stem. Dip the stem in water.
6. Floral tape the moist cotton wrapping.
7. Extend the stem using a no. 26 wire.
8. Floral tape the extended wire to create a neat, smooth stem.

III. Wiring a phalaenopsis orchid.

1. Floral tape a no. 26 wire.
2. Make a hairpin hook with a crook.
3. Holding the orchid in the left hand, insert the taped wire down the sides of the hard, pistil-like knob on the orchid flower head.
4. Using a no. 26 wire, wrap a piece of dry cotton at the base of the flower head. Dip the cotton in water.
5. Floral tape the moist cotton wrapping.
6. Continue wrapping the entire stem to create a neat, smooth appearance.

IV. Wiring stephanotis.

1. Floral tape a no. 26 wire ¼" from the top. Twist the tape around the top of the wire 4-6 turns.
2. Form a hook at the top of the wire. Bend the floral taped section to make a smooth, round knob.
3. Gently pull the hooked wire down through the middle of the flower head until the floral taped knob fits perfectly inside the base of the flower.
4. Floral tape the protruding wire to create a stem for the flower head.

LABORATORY EXERCISE 2

CONSTRUCTING A PEW BOW WITH FLOWERS AND GREENS

PURPOSE: The purpose of this laboratory exercise is to develop the student's ability for constructing pew bow decorations.

MATERIALS:

1. knife
2. ribbon shears
3. wire cutters
4. no. 9 or 40 ribbon
5. floral tape, brown and green
6. no. 16 and 24 florist wire
7. assorted flowers and foilages (e.g., carnations, roses, leather leaf)

PROCEDURES:

1. Tape a no. 24 wire.
2. Construct a bow using no. 9 or 40 ribbon, with at least three loops on each side.
3. Attach streamers by inserting a piece of ribbon, 18" in length, through the center of the bow.
4. Secure the bow with the taped wire. Cut the ribbon streamers to the desired length.
5. Arrange a small cluster of flowers and foliage, and bind with wire or floral tape.
6. Using the wire from the bow, attach the bow to the middle of the flower cluster. Arrange the flowers so they can be seen from behind the bow.
7. Tie the bow decoration to the side of the pew with ribbon.
8. The pew bow also can be attached by making a simple wire frame that hangs over the pew end.
    a. Using brown floral tape, tape together 2, 24" lengths of no. 16 wire.
    b. Bend the taped wires so they form a loop large enough to fit over the pew end.
    c. Using ribbon or binding wire, securely fasten the pew bow at the bottom of the wire frame.

LABORATORY EXERCISE 3

CONSTRUCTING AN ARM BOUQUET

PURPOSE: The purpose of this laboratory exercise is to develop the students' skills for constructing arm bouquets for weddings.

MATERIALS:

1. knife
2. ribbon shears
3. wire cutters
4. no. 9 ribbon
5. floral tape
6. no. 30 wire
7. flowers and foliage (e.g., roses, carnations, baby's breath, leather leaf, sprengeri)

PROCEDURES:

1. Select the desired number of flowers for the bouquet. Leave the natural flower stems attached.
2. Working on a flat surface, arrange the foliage background.
3. Arrange the flower(s) on top of the foliage background.
4. Add baby's breath or other filler flowers to soften the bouquet.
5. Bind the flower and foliage stems together, in the middle, using no. 30 wire.
6. Attach a bow with streamers to the middle of the arm bouquet.

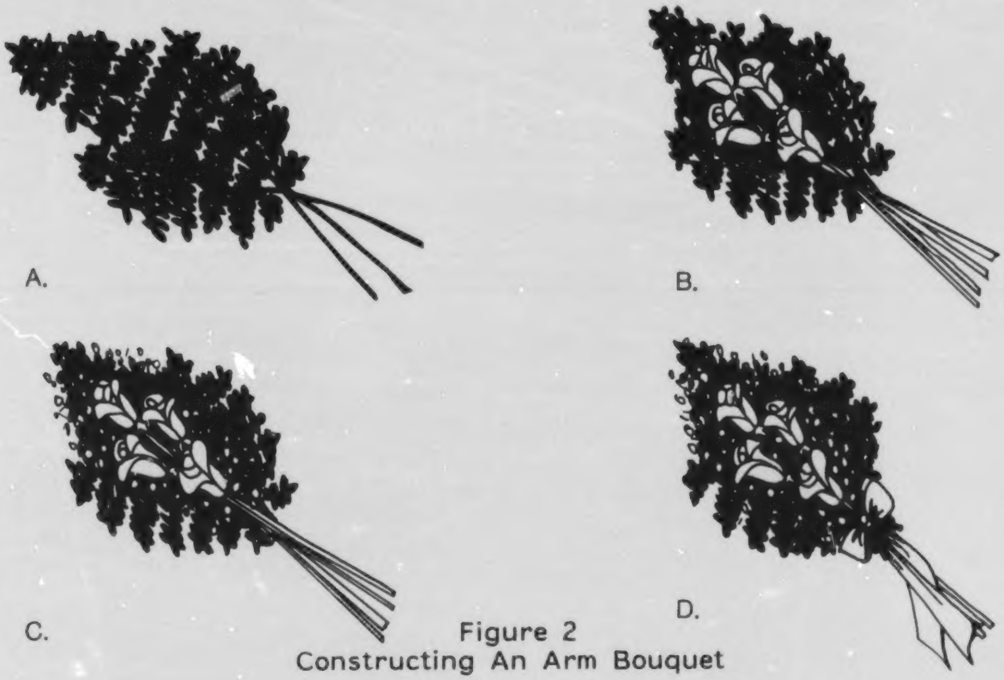


Figure 2
Constructing An Arm Bouquet

LABORATORY EXERCISE 4

CONSTRUCTING A CASCADE BOUQUET

PURPOSE: The purpose of this laboratory exercise is to develop the students' skills in constructing a cascade wedding bouquet.

MATERIALS:

1. knife
2. wire cutters
3. floral tape
4. no. 20 wire
5. floral foam bouquet holder
6. flowers (e.g., mini-carnations, roses, stephanotis)
7. foliage (e.g., ivy, leather leaf, camellia leaves)

PROCEDURES:

1. Construct a colonial wedding bouquet to form the top portion of the cascade bouquet. Follow the procedures outlined in Core III, Unit M, Problem Areas 3, Laboratory Exercises 8 and 9.

2. Construct the garland.

    a. Individually wire and tape all flowers and foliage pieces. Follow the correct wiring methods for different types of flowers and foliages as outlined in Core III, Unit M, Problem Area 3, Laboratory Exercise 2.

    b. Start the garland by wiring and taping together a single flower bud and a small piece of foliage. Use no. 20 wire.

    c. Continue to attach small clusters of flowers and foliage. Cut the excess wire after each addition to the garland.

    d. Do not tape the flowers or foliage at their base into the garland. Leave a ½" stem to provide flexibility in shaping the garland.

    e. Allow greater spacing between the clusters of flowers and foliage at the outermost parts of the garland.

    f. Group clusters of flowers and foliage in increasing numbers and at shorter distances at the uppermost parts of the garland.

    g. Point flowers at the tip of the garland down. As the garland progresses upward, point the flowers out at an increasing angle. Bend the foliage to avoid a flat appearance.

3. Insert the completed garland into the floral foam. Securely fasten the garland to the bouquet holder using no. 20 wire. Cover all mechanics with foliage.

4. The garland should appear to radiate from the focal point of the bouquet.

LABORATORY EXERCISE 5

DECORATING A FLOWERGIRL'S BASKET AND A RING BEARER'S PILLOW

PURPOSE: The purpose of this laboratory exercise is to develop the students' skills in decorating a flowergirl's basket and ring bearer's pillow.

MATERIALS:

1. knife
2. ribbon shears
3. wire cutters
4. floral tape
5. no. 1 or 3 ribbon
6. wicker basket
7. petals from roses or other flowers
8. a small pillow
9. boutonniere pins
10. flowers (e.g., sweet heart roses, mini-carnations
11. foliage (e.g., leatherleaf, sprengeri)

PROCEDURES:

I. Decorating the flowergirl's basket:

1. Securely fasten a small container to the base of the basket using floral adhesive.

2. Construct a small, round arrangement in the container. Make certain to cover all mechanics.

3. Attach a bow with streamers to each side of the basket where the handle meets the base.

4. Prior to the wedding ceremony, place flower petals around the bottom of the basket.

II. Decorating the ring bearer's pillow:

1. Construct a small corsage with a bow.

2. Spray the corsage with water, wrap, and refrigerate.

3. Pin the corsage to the pillow prior to the wedding ceremony.

TEACHER'S KEY

STUDENT WORKSHEET 3

CALCULATING A WHOLESALE FLOWER ORDER FROM A WEDDING ORDER

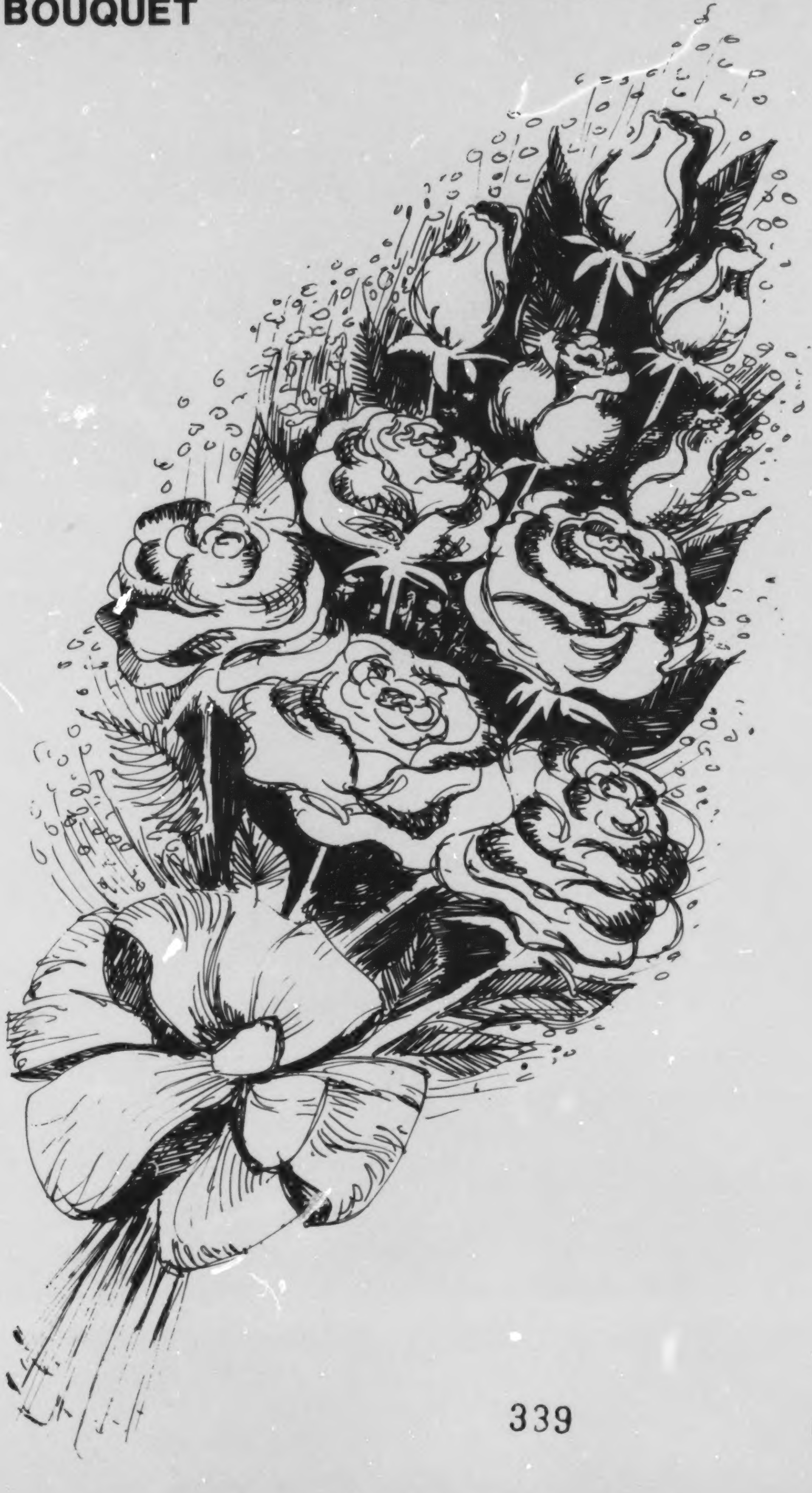
PROCEDURE: Read the wedding narrative in Student Worksheet 2 and fill out a wedding order form from Information Sheet 4. Then fill in the information requested below.

Type of Flower/ Foliage	Number of Flowers needed for the wedding	# of bunches to be ordered	Cost
1. White roses	43	2 bunches	-
2. Orchid	1	1	-
3. Gardenia	3	1 box	-
4. Baby's breath	1 bunch	1 bunch	-
5. Gladiolas	10	1 bunch	-
6. Carnations	25	1 bunch	-
7. Leather leaf	60 stems	3 bunches	-

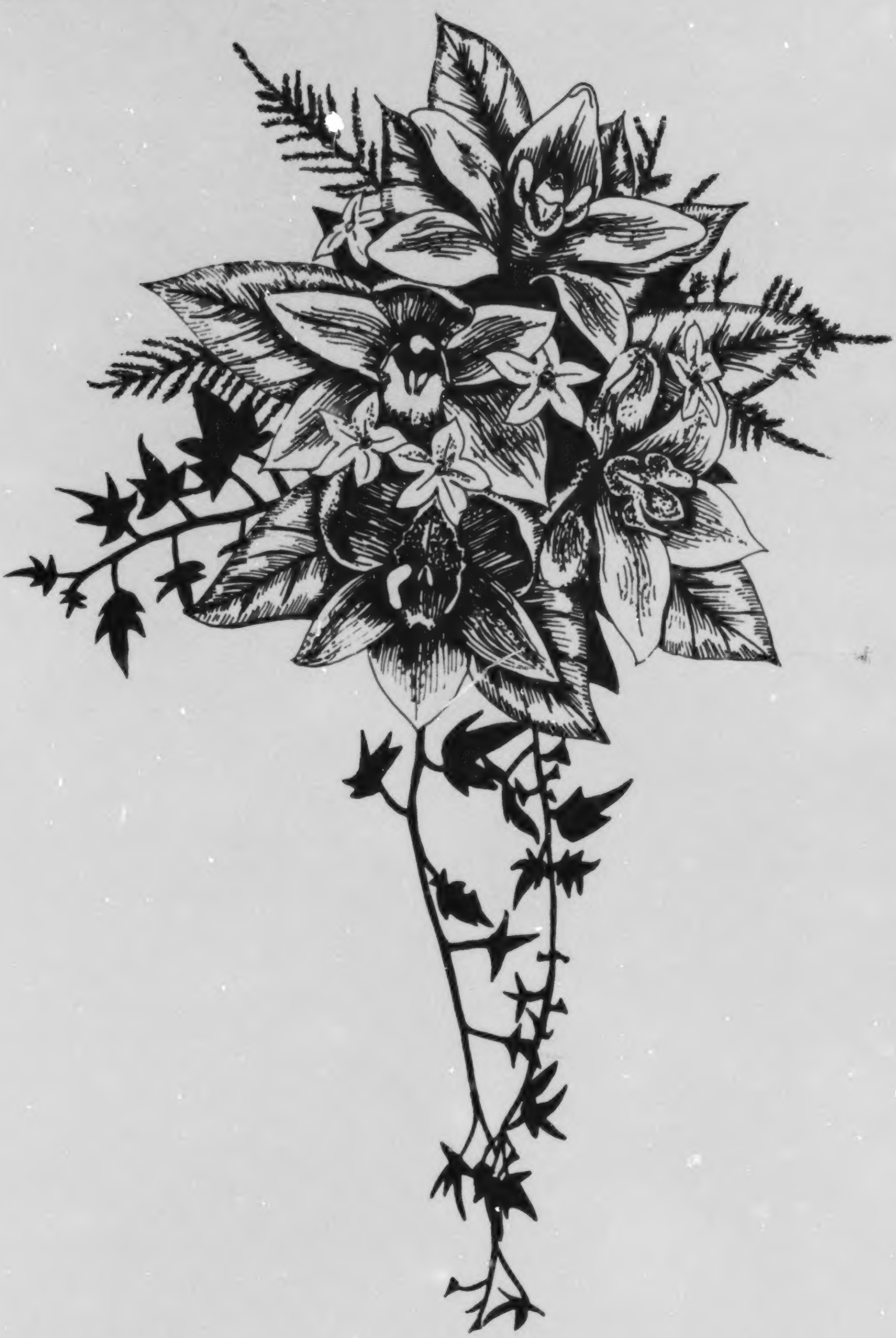
Other materials to be ordered:

1. Aisle runner - 50 ft.
2. wire
3. tape
4. corsage & boutonniere pins
5. no. 3 white ribbon
6. wristlet
7. corsage bags
8. corsage boxes
9. boutonniere bags
10. boutonniere boxes

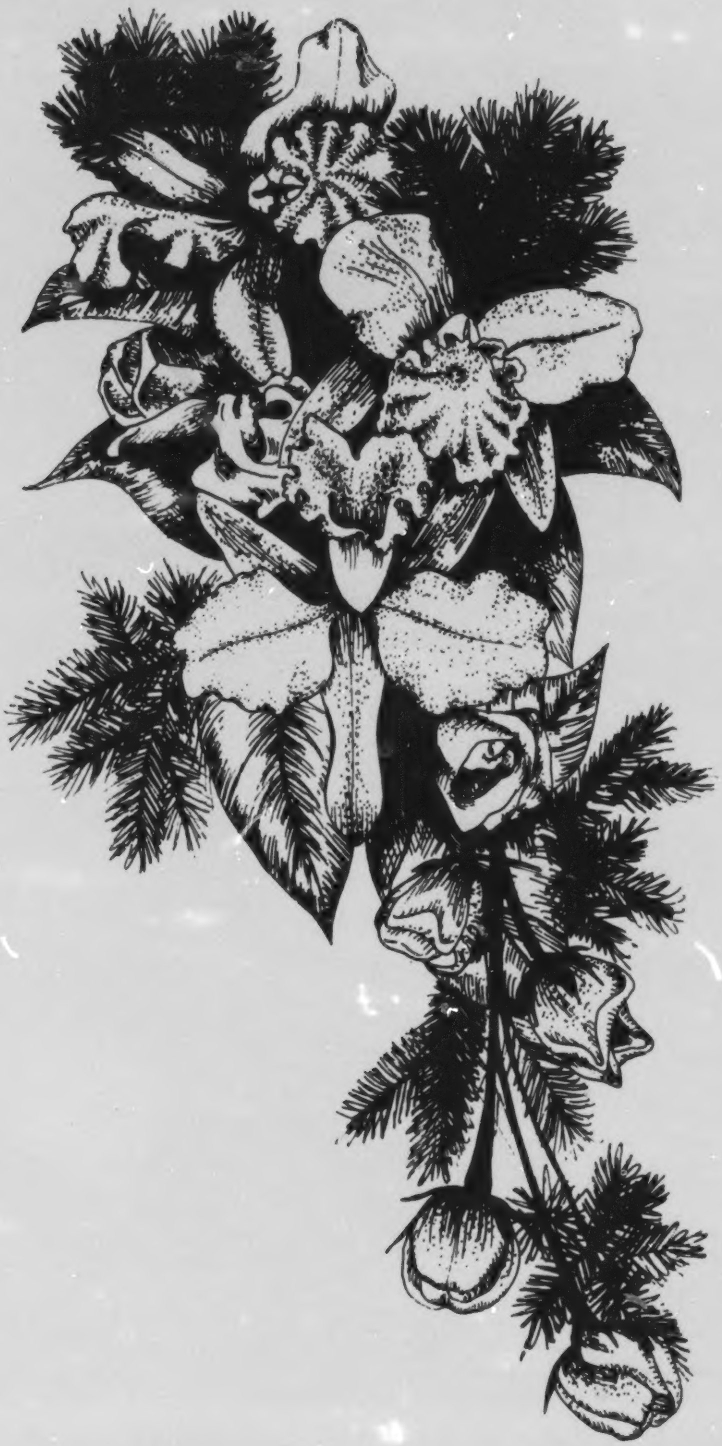
ARM BOUQUET



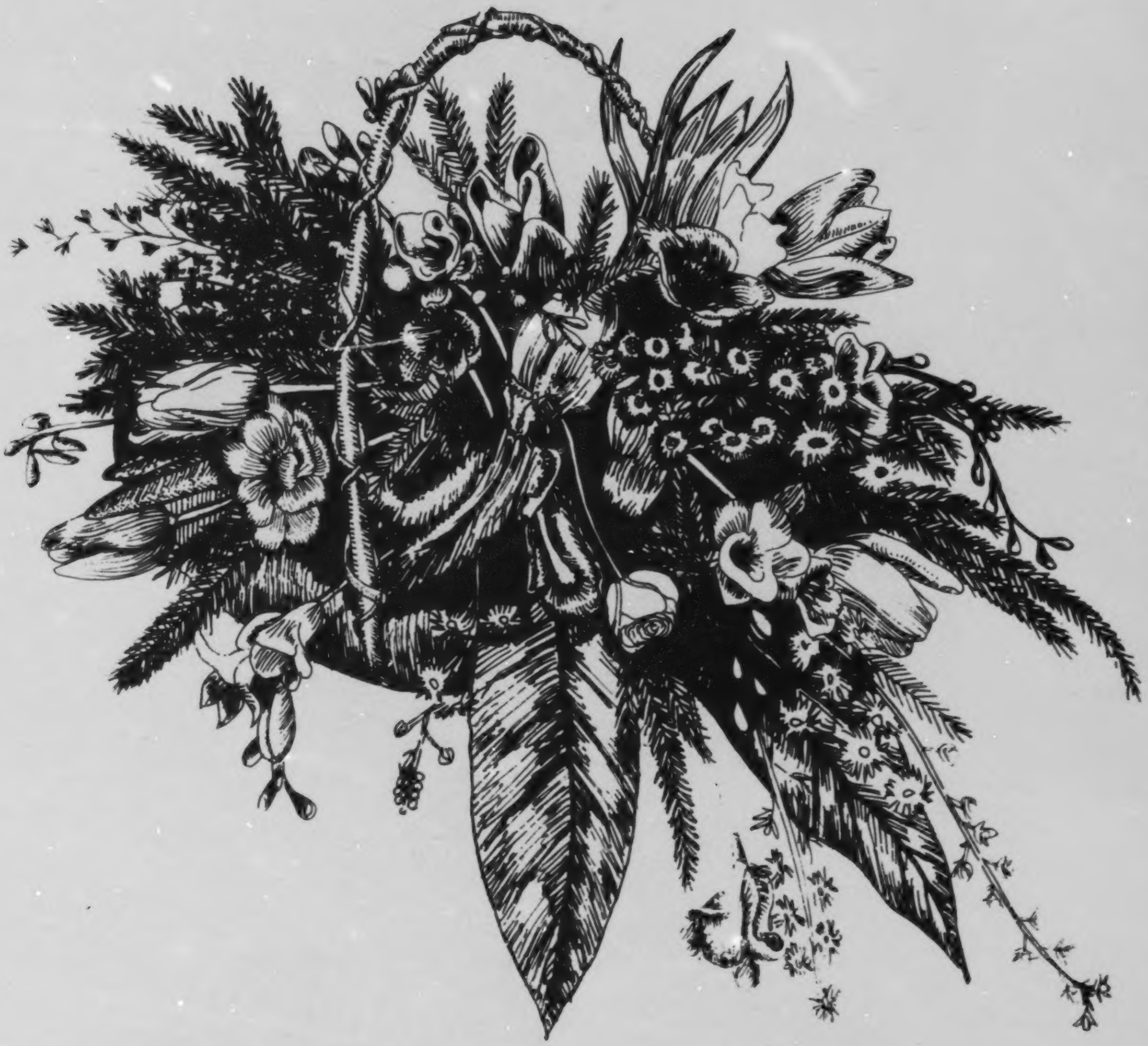
COLONIAL BOUQUET



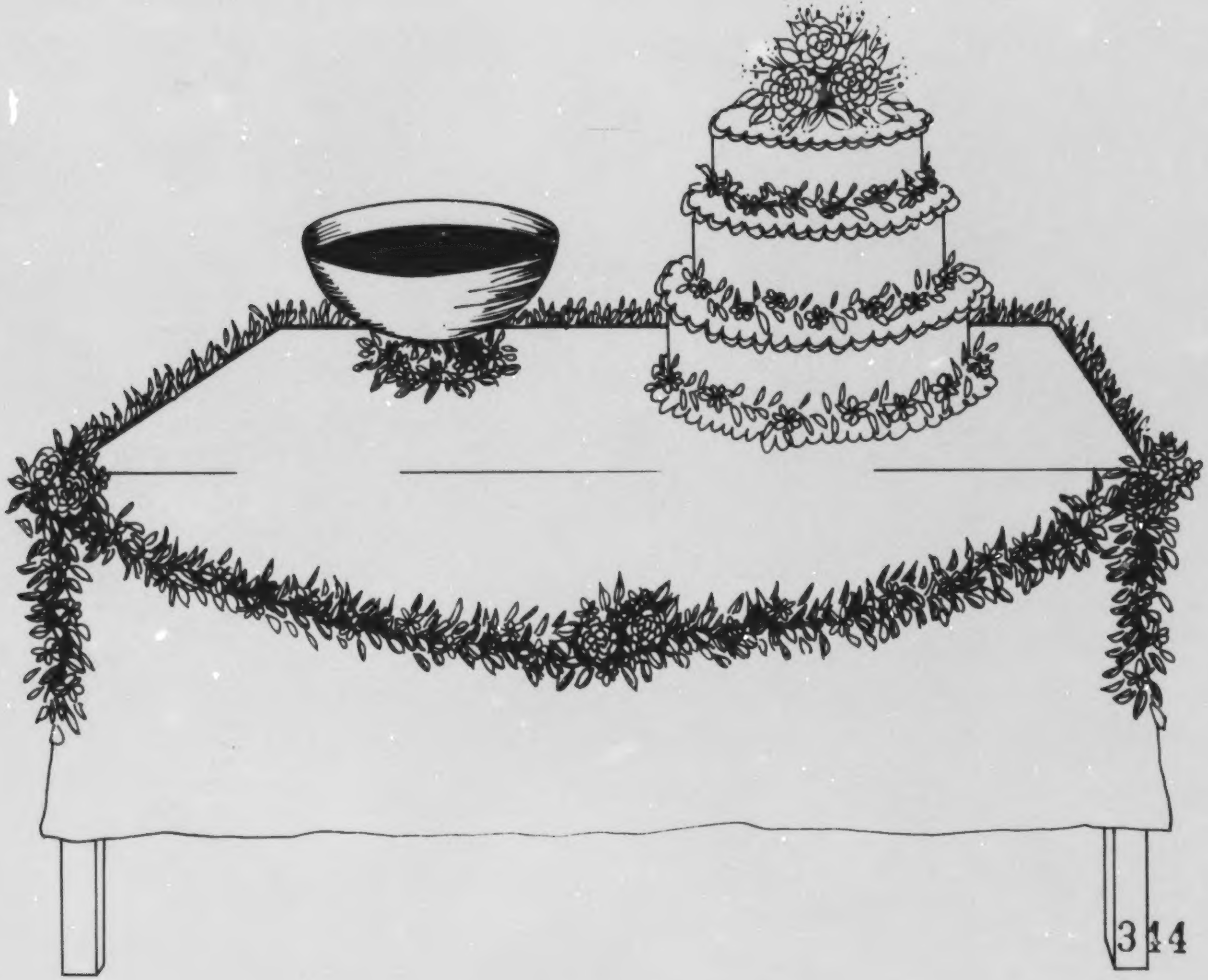
CASCADE BOUQUET



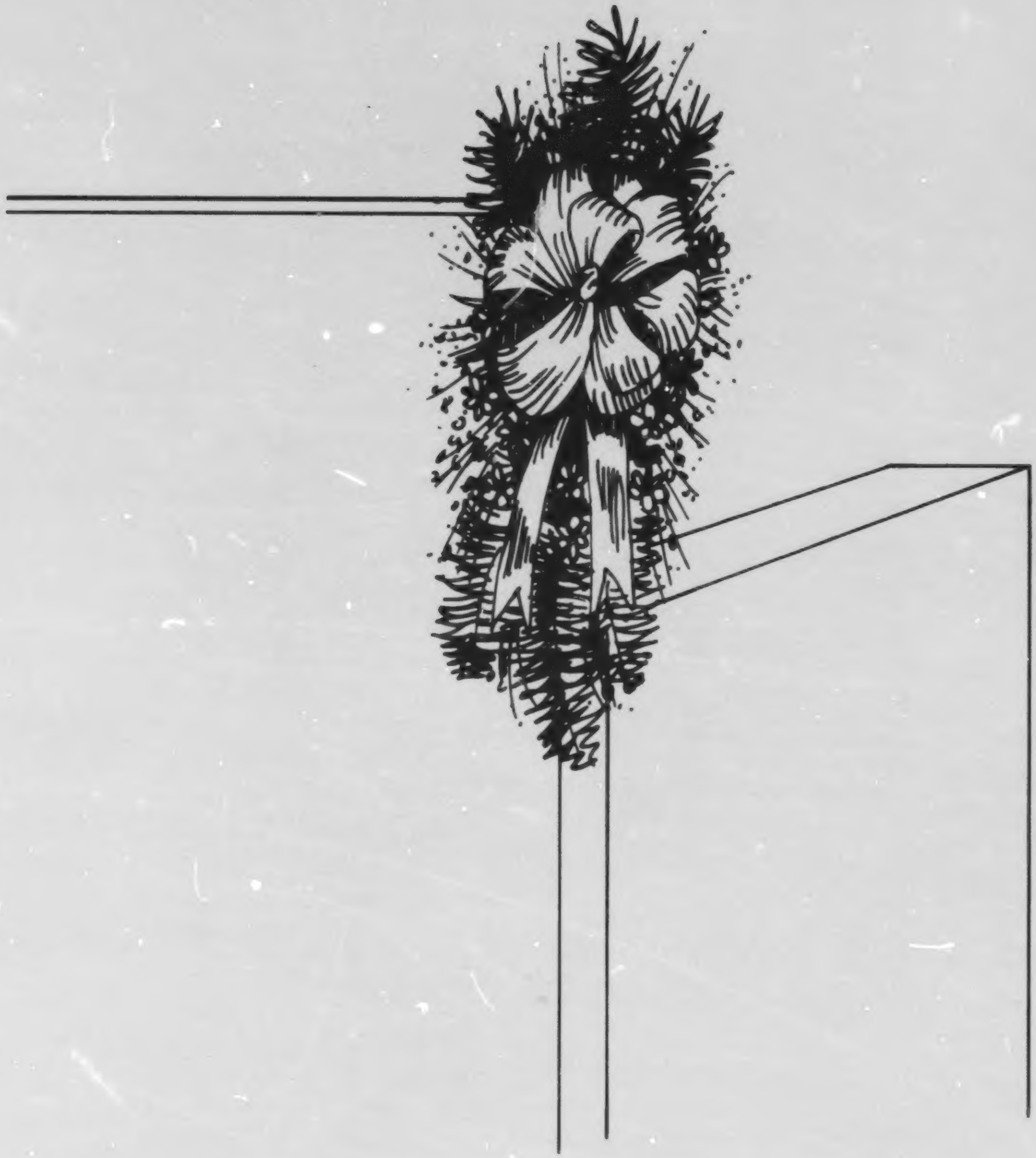
BASKET BOUQUET



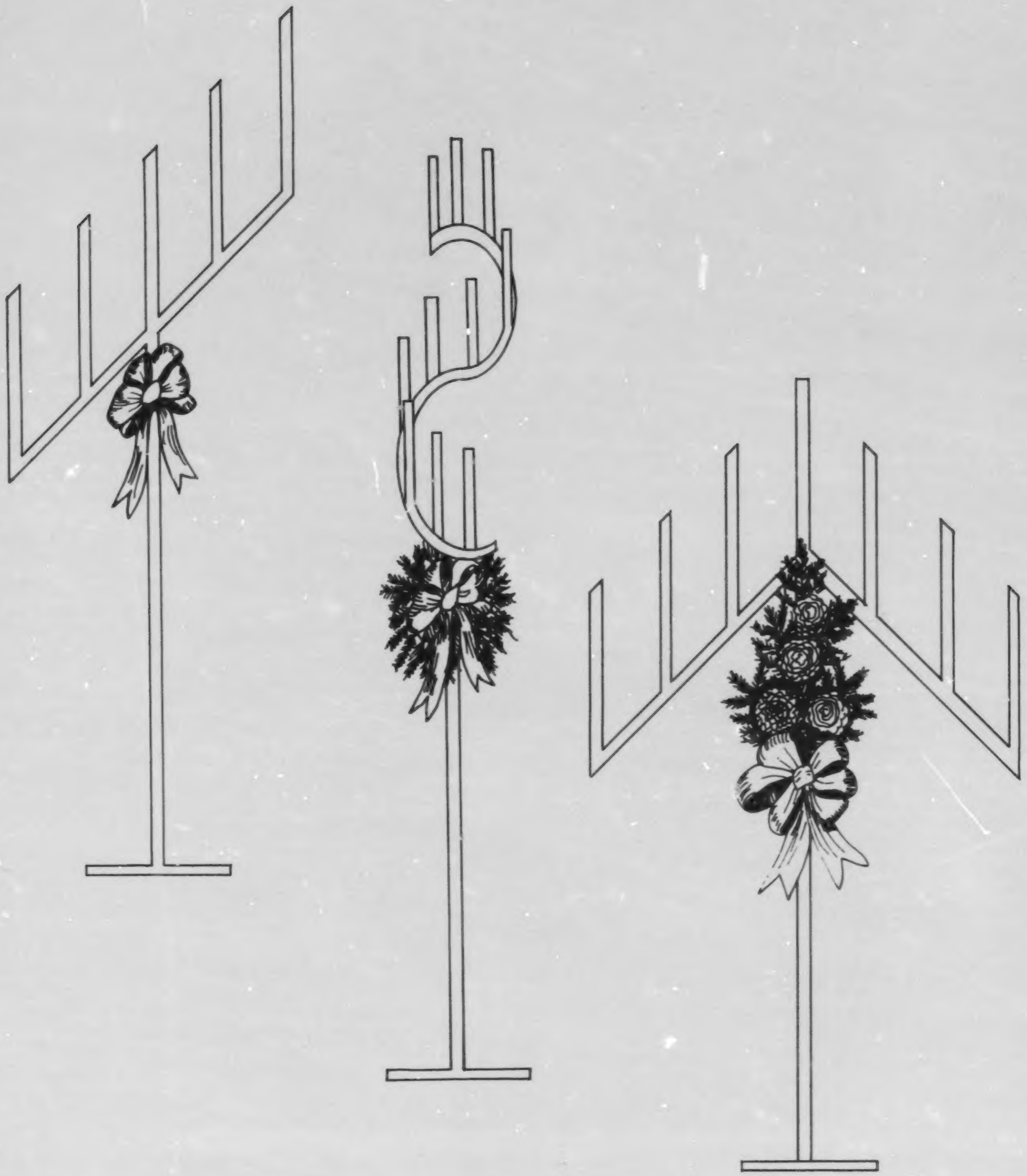
RECEPTION DECORATIONS



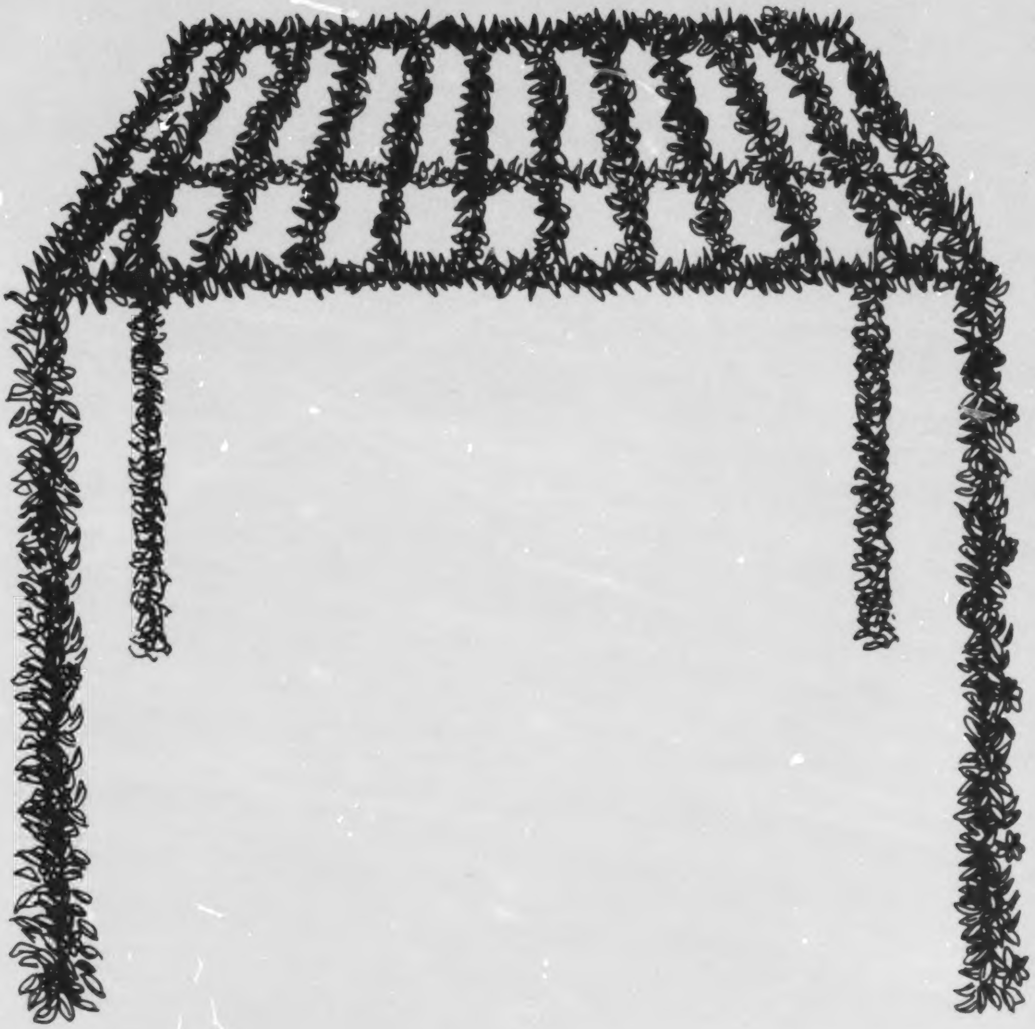
PEW DECORATIONS



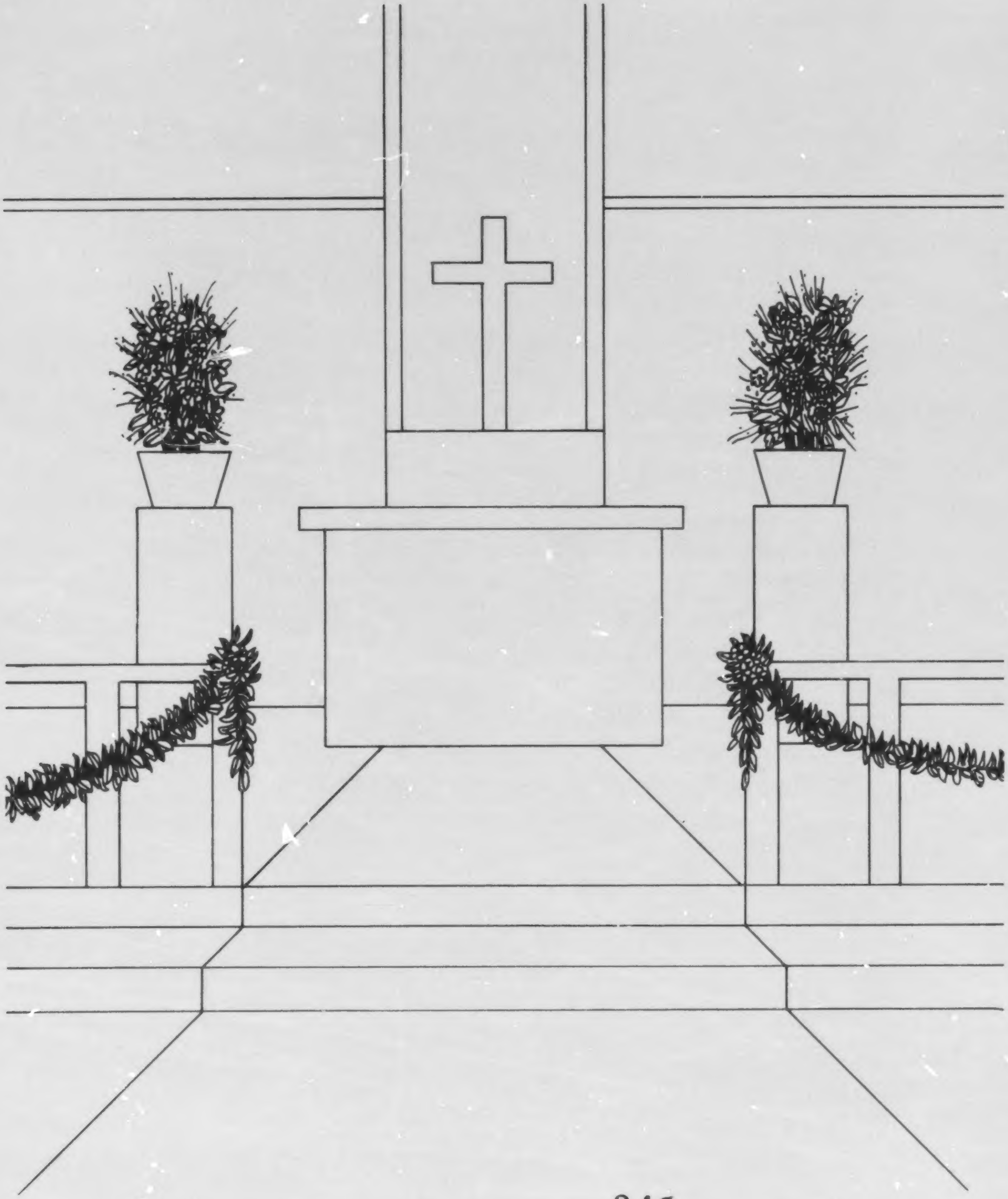
CANDELABRAS



CANOPY



CEREMONY DECORATIONS



TRANSPARENCY DISCUSSION GUIDE

DESIGNING WEDDING ARRANGEMENTS

I. Transparency--ARM BOUQUET

A. The arm bouquet is carried in the crook of a bride's or bridesmaid's arm. Many types of flower may be used in this bouquet. The long natural stems of flowers and foilage are a part of its design.

II. Transparency--COLONIAL BOUQUET

A. The colonial bouquet is a round-shaped bouquet that is held in a bride's or bridesmaid's hand. The bouquet is composed of evenly-distributed flowers and foliage.

III. Transparency--CASCADE BOUQUET

A. The cascade bouquet is an elongated form of the colonial bouquet. The shape may be oval, triangular, or crescent shaped, and tapered to a point in front of the bride.

IV. Transparency--BASKET BOUQUET

A. The basket bouquet consists of a basket filled with an arrangement of flowers and foliage. The basket may be carried on the arm or in the hand of the bridesmaid or bride.

V. Transparency--RECEPTION DECORATIONS

A. Flowers are arranged in a small plastic container and placed on top of the cake. Loose flowers and greens are placed along the base of the cake. The cake table also may be decorated with garlands and bows. These are usually pinned to the tablecloth.

VI. Transparency--PEW DECORATIONS

A. Pew bows decorate the pews along the center aisle of the church or synagogue. They may be used as plain bows or decorated with flowers and foliage.

VII. Transparency--CANDELABRA

A. Candelabra come in several shapes and sizes, but usually contain one, three, or seven candles. They are used in pairs and placed on either side of the altar or along the aisle. Candelabra may be decorated with bows, flowers, and foliage. The construction is similar to the pew decoration.

VIII. Transparency--CANOPY

A. Canopies are used in Jewish weddings and in outdoor weddings. Canopies may be constructed of wood, metal, or plastic. They are decorated with flowers, foliage, and bows.

IX. Transparency--CEREMONY DECORATIONS

A. When decorating a church or synagogue care must be taken to uphold all rules and traditions. If an aisle runner is used in the ceremony, it is securely fastened to the steps and/or carpeting with corsage pins.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

DESIGNING WEDDING ARRANGEMENTS

SHORT ANSWER:

1. What items would you include in a wedding emergency kit?

   Ribbon, floral tape, wire, extra flowers and foliage, corsage pins, needle and thread, straight pins, adhesive tape, comb, nail file, safety pins, cotton balls, thumbtacks, flashlight, ribbon shears, wire cutters.

2. What materials should you have available during an initial wedding interview?

   Samples or photographs of wedding bouquets and ceremony/reception decorations, a wedding etiquette book, bridal magazines, floor plans and photographs of various churches and synagogues, and listings of available properties for receptions.

3. At the flower shop where you work, you have been asked to handle the installation of all the wedding ceremony decorations. What questions would you ask the church official regarding floral decorations for the ceremony?

   What decorations are allowed on the altar? Can pew and aisle decorations be used? What types of floral decorations are commonly used in wedding ceremonies at the church? Are any other church activities occurring on the day of the wedding.

4. As a florist why should you be familiar with the wedding customs of the different religious denominations in the community?

   Different religious denominations have different policies and traditions regarding wedding ceremonies. A florist should be familiar with local customs so he or she can suggest appropriate decorations for the wedding ceremony, provide advice on the number and types of floral pieces needed, and offer accurate information while discussing ceremony decorations during the wedding interview.

5. List four types of information that should be obtained on a wedding order.

   a. The date, time, and location of the ceremony and reception.

   b. A complete list of all members of the wedding party including age, height, weight, eye and hair color.

   c. A complete description of the bride's and bridesmaid's gowns.

   d. Home and work telephone numbers of the bride, bride's mother, and groom.

6. Select a specific religious denomination and explain 3 guidelines to follow when planning the floral decorations for a wedding ceremony.

   Answers will vary - see Information Sheet 2

7. List four safety precautions to follow when planning and installing wedding decorations.

   a. When using candles, keep them away from all possible contact with the public.

   b. All combustible materials used to decorate the church must be fire-retardant.

   c. Access to exits and aisles must remain open at all times.

   d. Make sure the aisle runner is securely attached and free of puckers and wrinkles.

8. Name five critieria for evaluating a completed bridal bouquet.

   a. Is the bouquet lightweight?

   b. Are all wires covered?

   c. Is the handle finished?

   d. Is the bouquet constructed securely?

   e. Is the bouquet pleasing to look at?

9. From the following list of flowers, select one and explain the proper method for wiring that flower.

   Cattleya orchid
   Lily-of-the-valley
   Phalaenopsis orchid
   Stephanotis

   Answers will vary - See Laboratory Exercise 1

10. List three types of wedding bouquets and explain the differences between each one.

    a. Arm bouquet - Carried in the crook in the arm; the natural stems remain on the flowers.

    b. Colonial bouquet - A round bouquet carried in the hands.

    c. Cascade bouquet - An elongated form of the colonial bouquet which is tapered to a point in front of the bride.

UNIT M: RETAIL FLORICULTURE

PROBLEM AREA: DESIGNING FUNERAL ARRANGEMENTS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended time for teaching this problem area is upon completion of an introductory problem area on floral design techniques.

The estimated instructional time for this problem area is 10 to 12 days depending on how far the teacher wishes to go in developing specialized floral design skills. If the students are to be involved in other activity exercises, the instructional time will need to be increased. The instructor is encouraged to refer to Metropolitan Core Curriculum III - Unit M, Problem Area: Making Table Arrangements, Coursages, and Nosegays, to review basic floral design principles.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets, student worksheet, laboratory exercises, transparency discussion guide, and test questions were developed by Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp and Janet L. Henderson, Department of Vocational and Technical Education, University of Illinois.

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TEACHER'S GUIDE

I. Unit: Retail floriculture

II. Problem area: Designing funeral arrangements

III. Objectives: At the close of this problem area, students will be able to:

1. Identify the different types of funeral pieces.
2. Describe the correct uses of each funeral piece.
3. Design and assemble the basic funeral pieces.
4. Conduct a funeral interview and properly take a funeral order.
5. Properly deliver and install funeral flowers.

IV. Suggested interest approaches:

1. Find out how many of the students have ever been to a funeral and discuss what they remember about the flowers at the funeral.
2. Bring in an obituary notice from the newspaper and ask the students the following lead question:
    a. What do we need to know in order to take a proper funeral order?
3. Conduct a role playing session in which the teacher acts as the customer and the student acts as the salesclerk taking the customers' funeral order.

V. Anticipated problems and concerns of students:

1. What are the different types of funeral pieces?
2. Which funeral pieces are used most often?
3. Which funeral pieces are ordered by the family members?
4. How are the different funeral pieces used?
5. What are set pieces?
6. How do I choose the flowers to be used in a funeral piece?
7. How do I fit a funeral piece on the casket?
8. How do I attach a funeral piece to an easel?

9. How do I attach lettering to ribbons?
10. How do I conduct a funeral interview?
11. What information do I need on a funeral order?
12. How do I fill out and attach the card to a funeral piece?
13. How do I set up the funeral pieces at the funeral home?
14. What does "please omit" mean?

VI. Suggested learning activities and experiences:

1. Visit a funeral home and discuss the delivery and set up of funeral pieces.
2. Have the students develop a bulletin board in the classroom displaying the different types of funeral pieces.
3. Show slide set "Floral Tributes" demonstrating the step-by-step procedures for assembling the different types of funeral pieces.
4. Have the students visit a local funeral home, church, synagogue, or cemetery to find out which types of flowers and funeral pieces are preferred or allowed. Have each student give a short oral report of their findings to the class.
5. Have a local florist come to class and demonstrate the construction of unique funeral pieces such as the Eastern Star or Knights of Columbus emblem.
6. Obtain used funeral pieces from local funeral homes and display them around the classroom for students to study and critique.
7. Have the students practice making funeral bows, lettering ribbons, and writing cards for funeral pieces using Laboratory Exercise 1.
8. Have the students practice taking funeral orders from one another. Then have the students critique the "salespersons" who took their orders.
9. Have the students design and assemble funeral pieces following the laboratory exercises in this unit. Have the students critique each other's work using Student Worksheet 1 - Checklist for Critiquing Floral Designs. Then have the students take apart their work and reconstruct a different funeral piece with the same flowers.
10. Using the funeral pieces designed by the students, set up a simulated funeral in the classroom.

VII. Application procedures:

1. Skills learned in conducting funeral interviews and taking funeral orders will aid students working as salesclerks for retail florists.

2. Techniques learned in designing funeral pieces will aid students seeking employment as floral designers.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Administer a practical exam on the construction of the basic funeral pieces.

3. Evaluate laboratory exercises.

IX. References and aids:

1. Insko, Merle. Retail Flower Shop Salesperson and Floral Designer. Vocational-Technical Consortium of States, Kentucky, 1978.

2. State Board of Education. Retail Florist Teacher's Guide, Illinois Office of Education.

3. Ohio Agricultural Education Curriculum Materials Service, Room 254, 2120 Fyffe Road, Columbus, Ohio, 43210.

   a. Floral Tributes - AgDex 280/70 (slide set)

   b. Retail Floriculture Book II: Designing and Caring of Flowers and Foliage.

4. California Vocational Agriculture Curriculum Guidelines. Ornamental Horticulture: An Instructional Program in Vocational Agriculture, Vocational Educational Productions, California Polytechnic State University, San Luis Obispo, CA, 93407, June 1978.

5. Stearns, Steve. "The St. Louis Story: Funeral Directors State Their Preferences," Flowers &, November 1982, p. 53-5.

6. Moffitt, Oleta Staley. Arranging Flowers for the Church, Fortress Press, Philadelphia, 1977.

INFORMATION SHEET 1

TYPES AND USES OF FUNERAL PIECES

1. Casket Sprays-

   Casket sprays are usually oval or shield-shaped, and may be constructed in three ways:

   a. casket blanket - This spray is designed for the center of a closed casket. An adult-sized casket blanket is about five to six feet long.

   b. half casket spray - This spray is designed for the foot of a half-opened casket. An adult-sized half casket spray is about three feet long.

   c. lid spray - This spray is mounted on an open lid to "hang" over the casket. It is usually about five to six feet long.

   Casket sprays are almost always ordered by the immediate family, and are appropriate for a man, woman, or child.

2. Vase Arrangements-

   Vase arrangements are usually sent by close relatives and are often placed in stands at the head and foot of the casket. These arrangements usually match the casket spray using the same colors and/or flowers.

3. Standing Sprays-

   A standing spray is usually mounted on a tripod easel. The spray may be shield-shaped or triangular. Standing sprayes are the most frequently ordered design from friends, neighbors, and business associates. These sprays are appropriate for a man or woman.

4. Set Pieces-

   A set piece is any funeral design of novel or unique shape or size. These designs are placed on or near the casket and include wreaths, hearts, pillows, crosses, and emblems.

5. Fireside Baskets-

   Fireside baskets are arranged in oversized baskets that can be set on the floor near the casket. These baskets are usually sent by friends rather than relatives, and can be taken home by family members after the service.

6. Table Arrangements-

Table arrangements include smaller fresh, silk, or dried flower arrangements, blooming or greenhouse plants, dishgardens, and terrariums. These arrangements are usually set about the room at the funeral home to create a warmer, friendlier atmosphere. Table arrangements are almost always taken home by family members after the service.

7. Body Flowers-

Body flowers include corsages, boutonnieres, small bouquets, or a single flower on the lapel or in the hands of the body. The use of body flowers is an older tradition which has sharply declined in use. However when body flowers are used, they are always ordered by the immediate family.

INFORMATION SHEET 2

DEFINITIONS OF FUNERAL DESIGN TERMS

Cluster - A small cluster of flowers used as a focal point on set pieces. Clusters are usually a diamond, crescent, or shield-shape and contrast with the background color.

Easel - A wooden or metal tripod which supports a standing spray or set piece.

Foundation - The materials (Styrofoam, floral foam, or saddles) upon which any funeral design is mounted.

"Please Omit"- An expression used in obituary notices by the family to ask for donations to charities rather than sending funeral flowers.

Puffs - Ribbons or net loops inserted into a design as a focal point.

Saddle - A curved frame used to fit over the top of a casket and support a casket blanket or half casket spray.

Set piece - Any novel or unique funeral design placed on or near the casket including wreaths, hearts, pillows, crosses, and emblems.

Stem-picking - The method for mounting short-stemmed mass flowers onto the Styrofoam base of a set piece.

Water pick - A plastic tube, filled with water, to hold flowers in funeral pieces designed in dry foundations.

Wooden pick - A wooden stick and clutch wire upon which puffs, streamers, and other items are attached.

INFORMATION SHEET 3

HOW TO CONDUCT A FUNERAL INTERVIEW AND TAKE A FUNERAL ORDER

When conducting a funeral interview it is important to keep in mind the delicate nature of the customers' visit. The salesperson must be very patient and allow the customers plenty of time to decide what they would like to order. Whenever possible, the funeral interview should be conducted in a private consultation area. The florist should have a current obituary list available in case the customer doesn't know the date, time, or place of the services.

A funeral order should always include the general information obtained for any flower order, such as the customer's name and address, first and second choice of design, and the message on the card. For a funeral order, the following information is necessary in addition the the general information:

Will the casket be opened or closed - Ask the immediate family only.

Age of the deceased - Funeral pieces for infants and children will be considerably smaller than those for adults.

Sex of the deceased - Delicate flowers and soft colors are used more commonly for women. Carnations and mums in yellows or reds are often best for men; however, if the customer requests a specific flower or color, the florist should comply.

Time and place of the funeral - Flowers should be delivered to the funeral home the day the body will be shown. It is best to deliver the flowers 1-2 hours before the family will be arriving.

Relationship of the customer to the deceased - Immediate family, relative, friend, neighbor, or business associate.

INFORMATION SHEET 4

TIPS FOR FUNERAL FLOWERS AT THE CHURCH OR SYNAGOGUE

- Contact the church or synagogue to find out what (if any) types of floral decorations are allowed.
- Floral designs should never be taller than the top of the cross.
- The candles and arrangements should never be the same height.
- Don't crowd flowers onto a small altar.
- The color of the arrangements should harmonize with the colors of the church or synagogue.
- Altar flowers should be arranged in liners in the shop. These liners are then inserted into the altar vases at the church or synagogue.
- Never place an arrangement on a piano or organ. They are not places of worship and could possibly be damaged by moisture.
- Never let flowers touch or cover the cross.
- Never use flowers behind the cross.
- Never leave withered flowers on the altar or in the church or synagogue.
- Never leave empty vases on the altar.
- Avoid building arrangements in the sanctuary. If this cannot be avoided, get permission first.
- Never use colored or metallic paper around containers or pots of flowers.
- Never use odd vases, only those from the matching altar set.
- Keep the arrangements simple; church or synagogue flowers should never be overpowering.

INFORMATION SHEET 5

TIPS FOR DESIGNING FUNERAL PIECES

* Choose flowers for the design according to:

- -customer preference.
- -keeping quality.
- -biggest showing for the least money.
- -colors already used in other pieces.

* Use plastic casket saddles with rubber "grips" to avoid scratching the casket cover.

* Use plastic vases instead of papier-mache containers whenever possible.

* Never fill the container completely with water to avoid spills during delivery and in the funeral home.

* Check containers and casket saddles for leaks before arranging in them.

* Never use papier-mache containers for flower arrangements to be taken home by family members.

* Keep fireside baskets balanced during arranging so they will sit properly on the floor.

* Avoid using chicken wire inside containers to prevent scratches during handling.

* Avoid stapling letters onto ribbon to prevent rust marks due to dampness in the refrigerator.

* Include a description of the funeral piece on the back of the card and be sure it is securely attached to the arrangement.

* If a funeral delivery is going to be late, call the funeral director and let him or her know.

* Make deliveries to the funeral home in a professional manner. DO NOT wear worn out clothes, speed through the parking lot, or blast the truck radio.

* Check obituary notices before calling the funeral director with simple questions.

* Get to know the local funeral directors and work with them in organizing funeral flower procedures.

STUDENT WORKSHEET 1

CHECKLIST FOR CRITIQUING FLORAL DESIGNS

PROCEDURE: Complete the following checklist and comment on the design being critiqued.

Designer: ______________________________

Type of design: ______________________________ (ex. standing spray)

	YES	PARTIALLY	NO
1. Shape conforms to the assigned design.			
2. Design is balanced. (symmetrically or asymmetrically)			
3. The container, flowers, height, and width of the design are in proper scale and proportion.			
4. The color, texture, and shapes of the flowers and foliage blend together to create harmony.			
5. The design has a focal area.			
6. The rhythm of the design creates a feeling of motion toward the focal area.			
7. Repetition is present in the elements of the design.			
8. All of the parts blend together to create unity within the design.			

Comments:

LABORATORY EXERCISE 1

MAKING BOWS, LETTERING RIBBONS, AND WRITING CARDS FOR FUNERAL PIECES

I. MAKING BOWS AND LETTERING RIBBONS

PURPOSE: Students will construct a picked bow with a lettered streamer to be used with other laboratory exercises on designing funeral pieces.

MATERIALS:

1. wooden picks (wired)
2. no. 40 or no. 100 ribbon
3. ribbon shears
4. individual foil letters
5. foil script lettering
6. adhesive lettering
7. glue
8. tape
9. stapler

PROCEDURES:

1. Cut several strips of no. 40 or no. 100 ribbon into 6-8 inch lengths.

2. Gather both ends of a single ribbon strip between your fingers to form a loop.

3. Place the gathered ends of the loop against a wired wooden pick.

4. Wind the wire firmly around the loop and wooden pick to form a puff.

5. Repeat steps 2-4 for all of the ribbon strips.

6. Form the puffs into a bow by inserting the wooden picks into the design near the focal point.

To add streamers:

7. Cut 2-3 strips of no. 40 or no. 100 ribbon to the desired streamer length. The ends of the streamers should be cut on a diagonal slant.

8. Gather one end of the streamer and hold it firmly to a wired wooden pick. Wrap the wire around the ribbon and pick.

9. Insert the streamers into the design at the base of the bow.

To add lettering to the streamers:

10. Glue, staple, or tape individual foil letters onto no. 40 or no. 100 streamers to spell out "Uncle," "Grandmother," etc.

11. Glue, staple, or tape foil script lettering onto no. 40 or no. 100 streamers.

12. Peel the paper backing off the adhesive lettering and press it firmly onto no. 40 or no. 100 streamers.

II. WRITING CARDS FOR FUNERAL PIECES

PURPOSE: Students will practice writing proper funeral cards and determine the best way to attach the card to their various funeral pieces.

MATERIALS:

1. cards
2. envelopes
3. straight pins
4. string
5. hole punch
6. plastic card stake

PROCEDURES:

1. The card should be very neatly written or typed.

2. The front of the card should contain the customer's requested message.

3. The back of the card should contain the following information.

   a. Name of deceased
   b. Name of funeral home
   c. Brief description of the arrangement
   d. If it is an arrangement for a specific person to take home, note their name here too. (ex. For Mr. & Mrs. John Smith)

4. Insert the card into a cellophane envelope with the message showing through the window.

5. Attach the card to the design in a place where it can be read. The following methods may be used:

   a. Pin the card to a leaf or flower stem.
   b. Punch a small hole in the envelope and attach a string to it. Tie the card onto a flower stem.
   c. Fit the card onto a plastic stake and insert the stake into the foundation of the design.

LABORATORY EXERCISE 2

CASKET SPRAY

PURPOSE: The purpose of this laboratory exercise is to develop the students' skills for constructing a casket spray, and to make the students more aware of the time and number of flowers involved in the construction of funeral pieces.

MATERIALS:

1. green florist foil
2. no. 18 and no. 22 wire
3. green floral thread
4. floral foam blocks or Styrofoam block
5. florist's tape
6. no. 40 or no. 100 ribbon
7. wire casket frame or plastic casket saddle
8. water picks
9. wooden picks
10. florist's knife
11. adhesive lettering
12. ribbon shears
13. wire cutters
14. flowers and foliages
15. floral preservative

PROCEDURES:

1. Construct the foundation:

    a. Half casket spray or blanket spray -

        1. Saturate one block of floral foam in preservative water (2 blocks for blanket spray).

        2. Wrap the floral foam block in green florist foil. Bind the block with green floral thread wrapped around the foam several times.

        3. Tape four no. 18 wires and thread them through the holes in the saddle frame.

        4. Place the block in the center of the saddle and twist the wires together over the top of the block.

    b. Lid spray -

        1. Cut a Styrofoam bar to fit a wire casket frame.

        2. Bend four no. 18 wires and insert each end through the top of the Styrofoam bar.

        3. Pull the wire through the bottom of the Styrofoam and twist the wire ends around the frame.

2. Establish the foliage background:

    a. Insert a stem of foliage at a slightly downward angle 2 inches into each end of the foam to establish the length of the design.

   b. Insert a stem of foliage into the front and back of the foam to establish the width of the design. The flowers and foliages in the back of the design should be shorter than those in the front.

   c. Fill in the background foliage to form an outline of the desired shape.

3. Wire any weak or long-stemmed flowers for the half casket spray or blanket spray. Wire and water-pick all of the flowers for the lid spray. (Cut each stem to the desired length before water-picking.)

4. Establish the main lines:

   a. Insert the longest flower stems 2 inches into each end of the block and along the sides above the background foliage.

   b. Continue to insert flowers around the edges of the block with their stems pointing toward the center of the block.

   c. Add delicate foliage (ex. leatherleaf) over the top of the block with the stems angled toward the center.

5. Fill in the design:

   a. Add mass and/or form flowers to establish a three-dimensional shape over the top of the spray. Flowers closest to the center point will have the shortest stems.

   b. Fill in with more delicate filler flowers and foliage, leaving space for a bow and streamers.

6. Establish the focal point in the center of the design with several ribbon puffs inserted to form a bow beneath the central flowers. Streamers and lettering can be added if requested.

7. Hang half casket sprays and blanket sprays to drain off excess water from the design.

LABORATORY EXERCISE 3

STANDING SPRAY

PURPOSE: The purpose of this laboratory exercise is to develop the students' skills for constructing a standing funeral spray.

MATERIALS:

1. floral foam block
2. no. 18 and no. 22 wire
3. 2"x4"x18" Styrofoam bar
4. florist knife
5. green florist foil
6. green floral thread
7. water picks
8. 40" easel
9. wooden picks
10. no. 40 or no. 100 ribbon
11. water sprayer
12. flowers and foliages
13. floral preservative

PROCEDURES:

1. Construct the base:
    a. Floral foam base -
        1. Saturate a block of floral foam in preservative water.
        2. Wrap the floral foam block in green florist foil. Bind the block with green floral thread wrapped around several times.
        3. Wire the block to the easel using no. 18 wire. Wind the wire around the block in four places; twist the wire in back of the easel frame.
    b. Styrofoam base -
        1. Cut a Styrofoam bar to measure about 2"x4"x18".
        2. Hook the top of the Styrofoam bar onto the easel hook. Bind the bar to the easel in at least three places using no. 18 wire.
2. Establish the background foliage to form either a triangle or shield shape. Slant-cut each stem and insert them two inches into the foam angling toward the center of the spray.
3. Wire all the flowers and slant-cut each stem. Water-pick all of the flowers when using a Styrofoam base.
4. Establish the main lines of the design by placing three flowers into the foundation to form the outline of the triangle or shield. The flowers should extend several inches beyond the background foliage.
5. Establish the secondary lines by inserting the same flowers along the edge of the design filling in the shape of the triangle or shield.

6. Fill in the design with additional mass and form flowers. Then add delicate filler flowers and foliages to achieve a three-dimensional effect.

7. Mist the design well; then establish the focal point with several ribbon puffs and streamers or a large bow. The ribbon should match the dominant color in the spray and be worked into and around the flowers and foliage.

LABORATORY EXERCISE 4

VASE ARRANGEMENTS

PURPOSE: The purpose of this laboratory exercise is to develop the students' skills for constructing large vase arrangements for funerals.

MATERIALS:

1. papier-mache container
2. floral foam block
3. chicken wire
4. waterproof tape
5. wire cutters
6. ribbon shears
7. florist knife
8. no. 40 ribbon
9. no. 22 wire
10. 3" wooden picks
11. flowers and foliages
12. floral preservative

PROCEDURES:

1. Soak the floral foam block in preservative water. Place the block in the papier mache container with 3 inches of the block extending above the lower lip.

2. Cut a piece of chicken wire large enough to cover the foam. Bend the chicken wire down around the block and secure it to the container with waterproof floral tape.

3. Cover the mechanics with a few pieces of foliage.

4. Wire all weak or long-stemmed flowers.

5. Cut the first flower about 2½ times the height of the container. Insert the flower vertically in the back of the foam. For a symmetrical triangle the first flower should be in the center; for an asymmetrical triangle the first flower should be off-center to the right or left.

6. Insert the second and third flowers at each end of the foam forming right angles to the vertical flower. For a symmetrical triangle these two flowers will be the same length; for the asymmetrical triangle the stem nearest the vertical flower will be shorter than the other.

7. Insert a large flower at the front of the container to form a focal area.

8. Fill in the design with additional flowers to complete the outline of the arrangement.

9. Insert a large bow at the focal point making sure the lip of the container is covered.

10. Add filler flowers to the design to help blend the bow into the arrangement and to soften the texture of the larger flowers.

11. Add foliage to fill in wherever there are holes. Finish off the arrangement with a few pieces of foliage over the mechanics in back.

LABORATORY EXERCISE 5

SET PIECES

PURPOSE: The purpose of this laboratory exercise is to develop the students' skills for constructing various types of set pieces.

MATERIALS:

1. Styrofoam forms
2. easel
3. ribbon shears
4. wire cutters
5. florist knife
6. floral foam block
7. florist tape
8. netting
9. green florist foil
10. wooden pick
11. no. 18 and no. 22 wire
12. green floral thread
13. no. 3 or no. 9 ribbon
14. toothpicks
15. water sprayer
16. flowers and foliage
17. floral preservative

PROCEDURES:

1. To mount the Styrofoam form on the easel, tape a no. 18 wire, insert it through the Styrofoam, and twist the ends around the easel frame.
2. Stem-pick all the background flowers by removing all but ½-inch of the stem and mounting it onto a toothpick.
3. Insert stem-picked flowers along the edge of the Styrofoam at a 45° angle to establish the outline of the design.
4. Fill in the design with background flowers working from the outer edges to the center, and angling the stems to create a rounded three-dimensional effect. Space should be reserved at the focal point for the insertion of a flower cluster.
5. Establish the flower cluster:
    a. Cut a piece of floral foam and saturate it with preservative water. Wrap the foam in green florist foil and bind it with green floral thread.
    b. Tape 2-3 no. 18 wires. Bend the wires over the floral foam and down through the Styrofoam, twisting the ends of the wires together.
    c. Insert 4 flowers into the floral foam to establish the length and width of the cluster.
    d. Fill in the cluster, cutting the stems shorter toward the center of the design. Add foliage to frame the cluster and add a bow to the center of the cluster. Then add filler flowers and foliage to soften the cluster.

    e. The cluster should be diamond- or crescent-shaped. All the flowers should appear to radiate from a single point.

6. Establish an edge around the design with foliage or tufts of netting on wooden picks inserted close together around the edge of the design.

7. Mist the design thoroughly and refrigerate.

LABORATORY EXERCISE 6

FIRESIDE BASKETS

PURPOSE: The purpose of this laboratory exercise is to develop the students' skills for constructing fireside baskets.

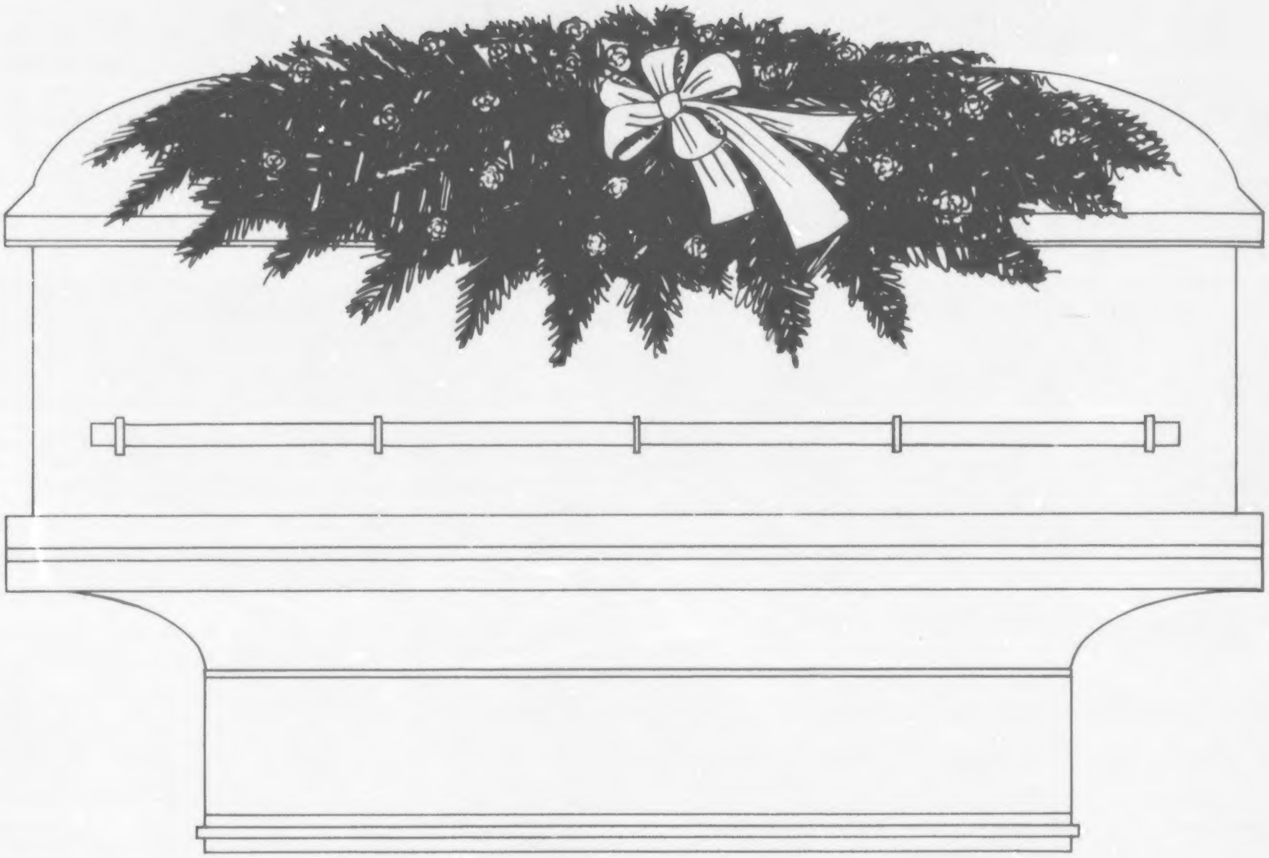
MATERIALS:

1. green florist foil
2. green floral thread
3. floral foam block
4. fireside basket
5. florist tape
6. no. 18 wire
7. wire cutters
8. florist knife
9. no. 22 wire
10. flowers and foliages
11. floral preservative

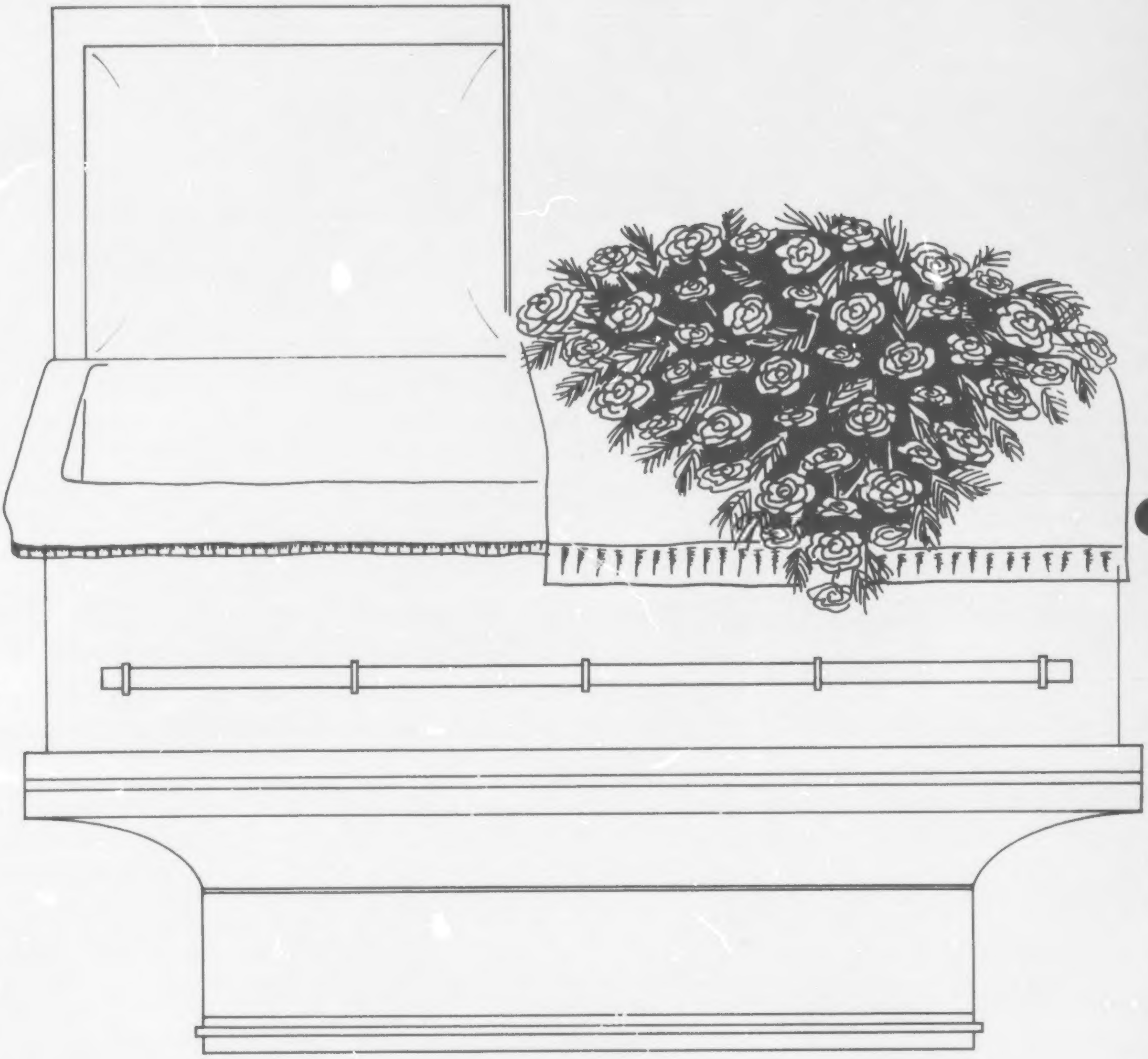
PROCEDURES:

1. Saturate a block of floral foam in preservative water. Wrap the block in green florist foil and bind with green floral thread.
2. Tape 2-3 no. 18 wires and bend the wires around the foam block in the center of the basket. Insert the wires through the bottom of the basket and tightly twist them together.
3. Before adding any flowers or foliage, make sure the basket is balanced. Test the basket for balance frequently during arranging.
4. The symmetrical triangle is the most appropriate design for a balanced fireside basket. Wire all weak or long-stemmed flowers. Cut the first flower stem so that it reaches just above the basket handle. Insert it vertically, centered in the back of the foam.
5. Insert the second and third flowers at each end of the foam at right angles to the vertical flower. These two flowers should extend a few inches beyond the edges of the basket.
6. Insert a large flower at the front of the basket to form a focal area. Be sure this flower does not protrude far enough to cause an imbalance.
7. Fill in the design with flowers following the triangular outline. Flower stems should be angled so they appear to radiate from a single point.
8. Fill in the arrangement with foliage. Make sure the back, rim, and mechanics are covered, and that the basket is still balanced.

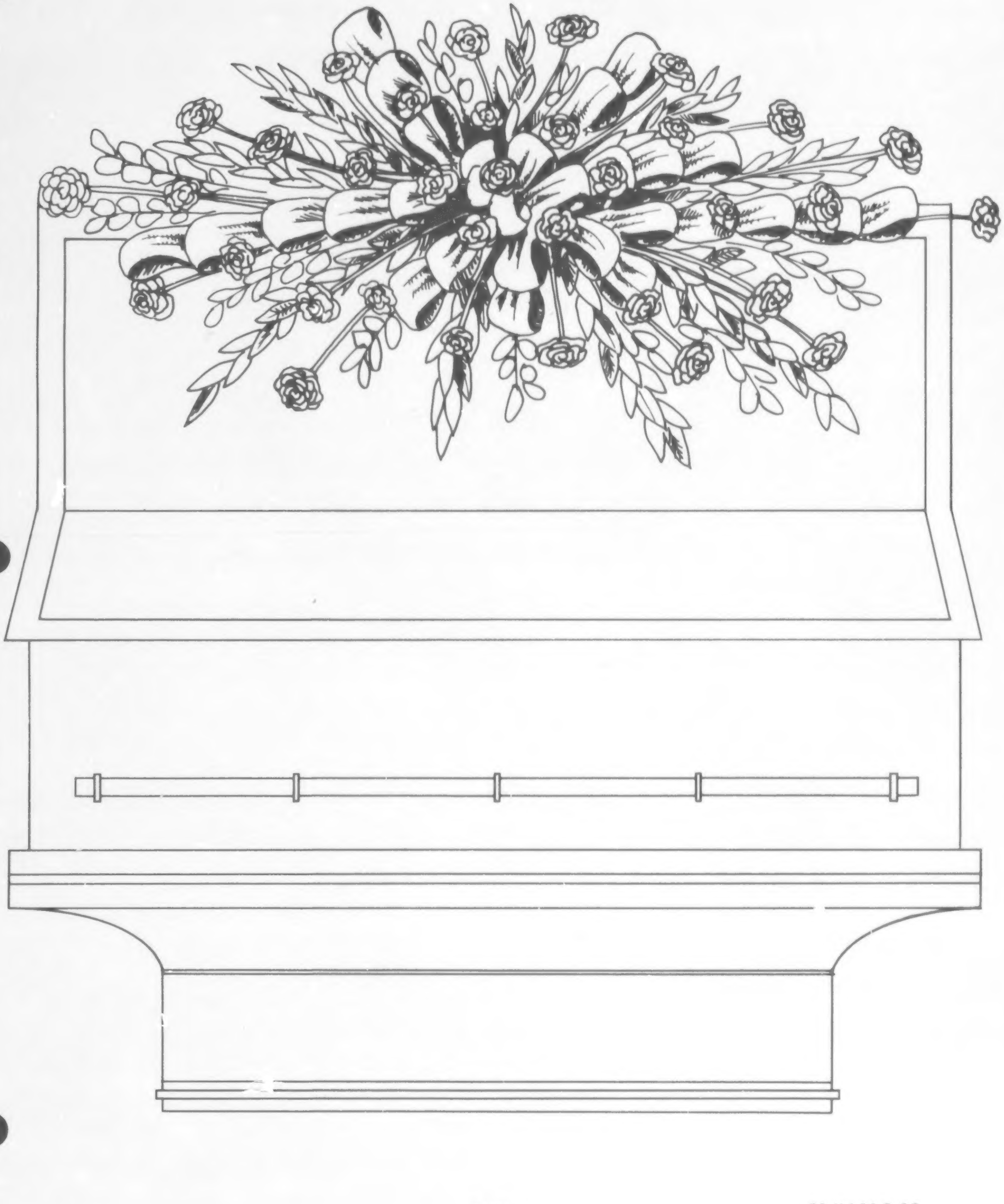
CASKET BLANKET



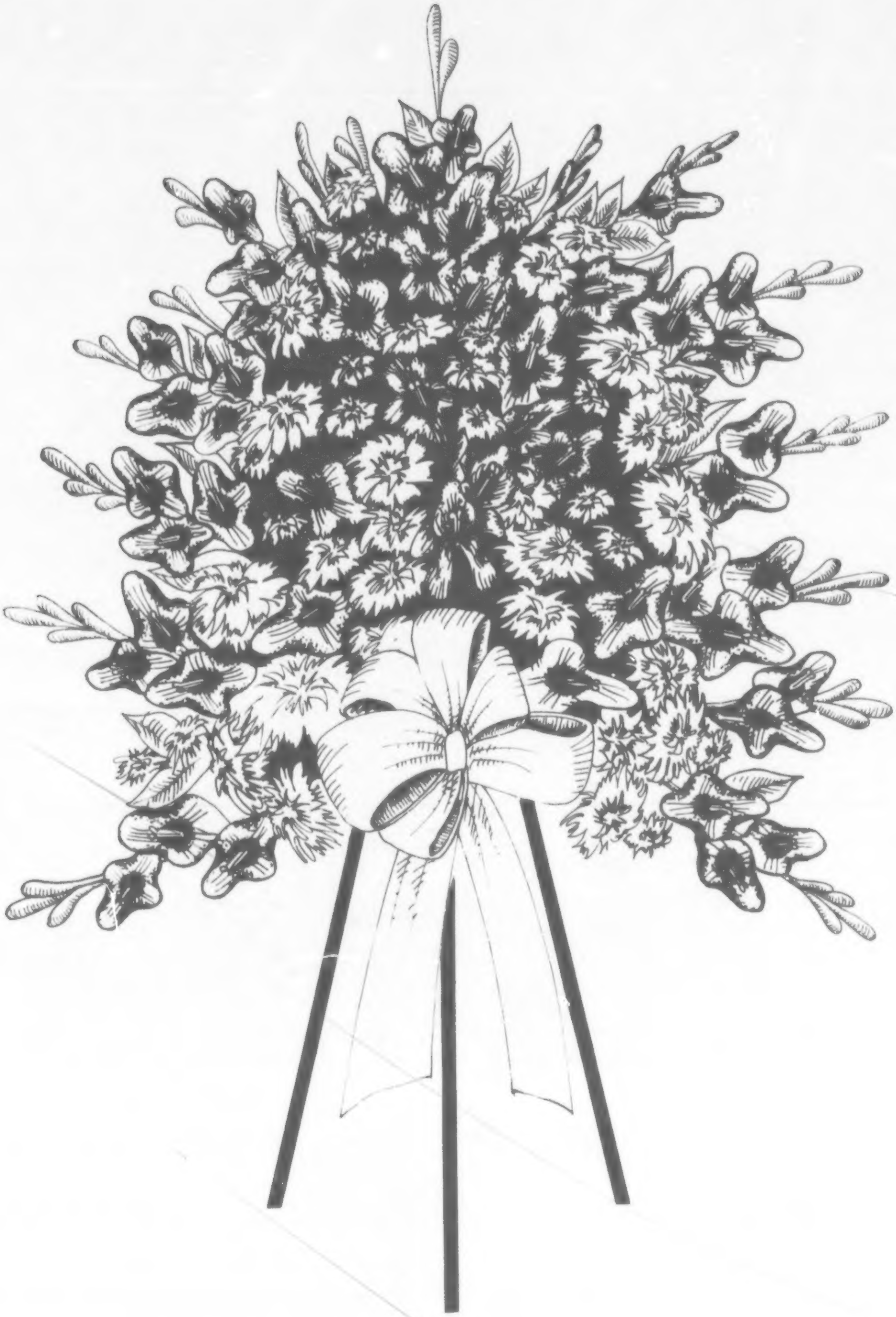
HALF CASKET SPRAY



LID SPRAY

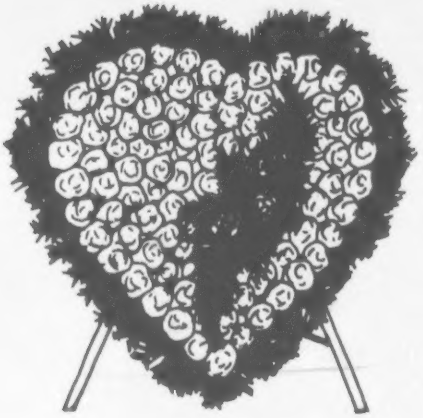


STANDING BOUQUET

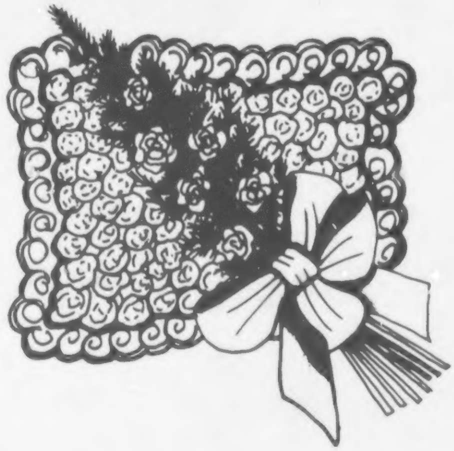


SET PEICES

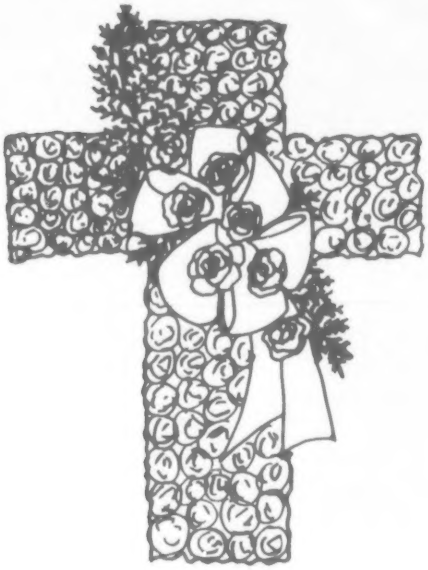
HEART ON EASEL



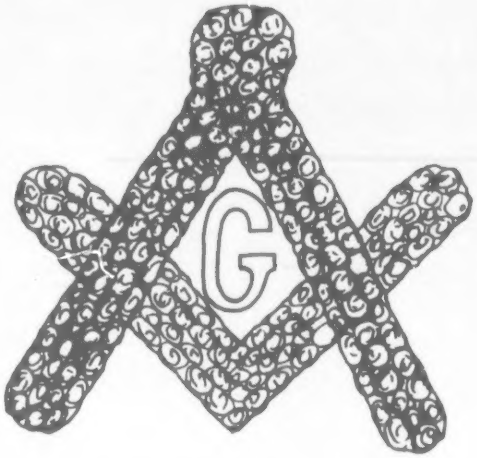
PILLOW



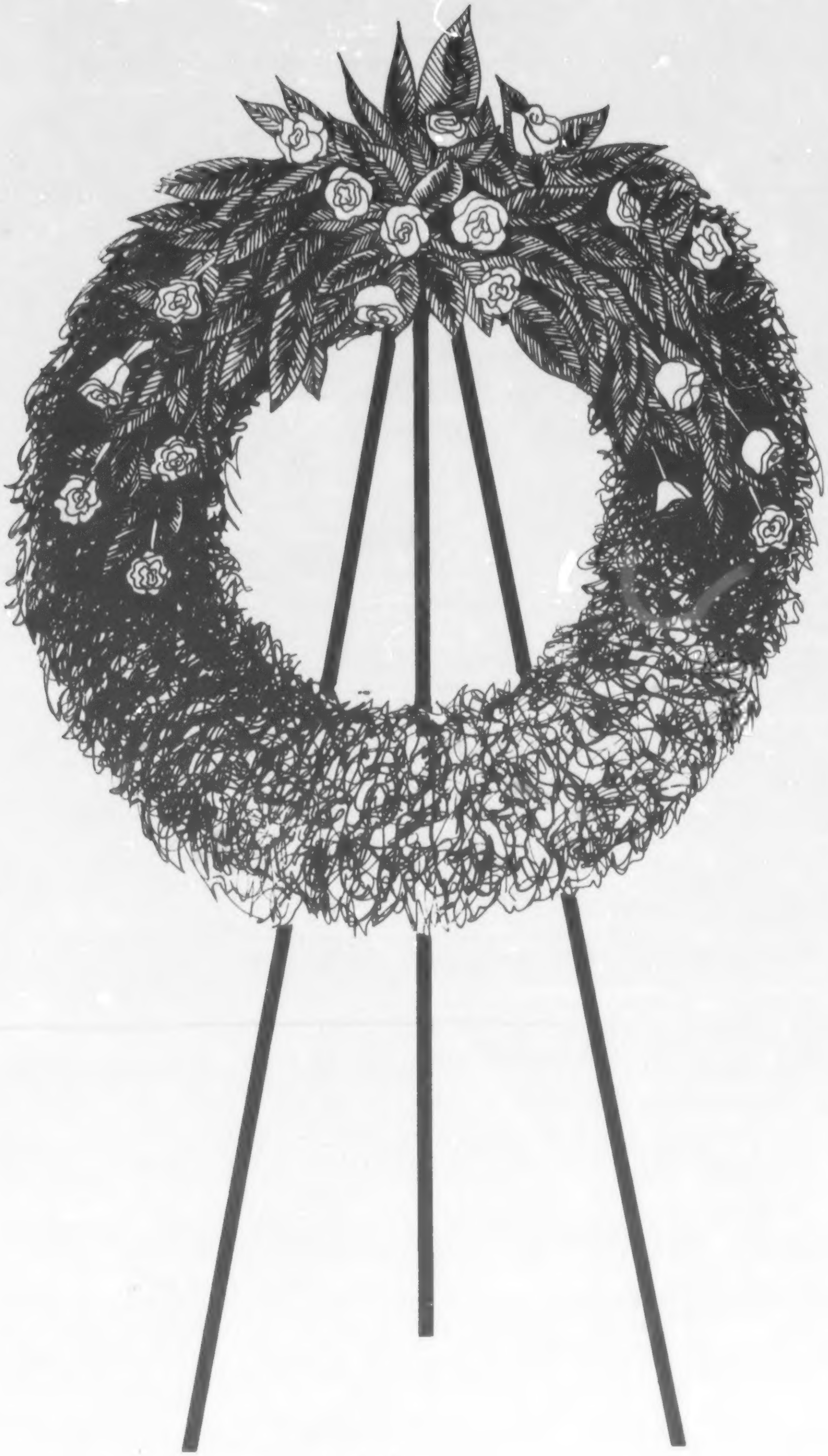
CROSS



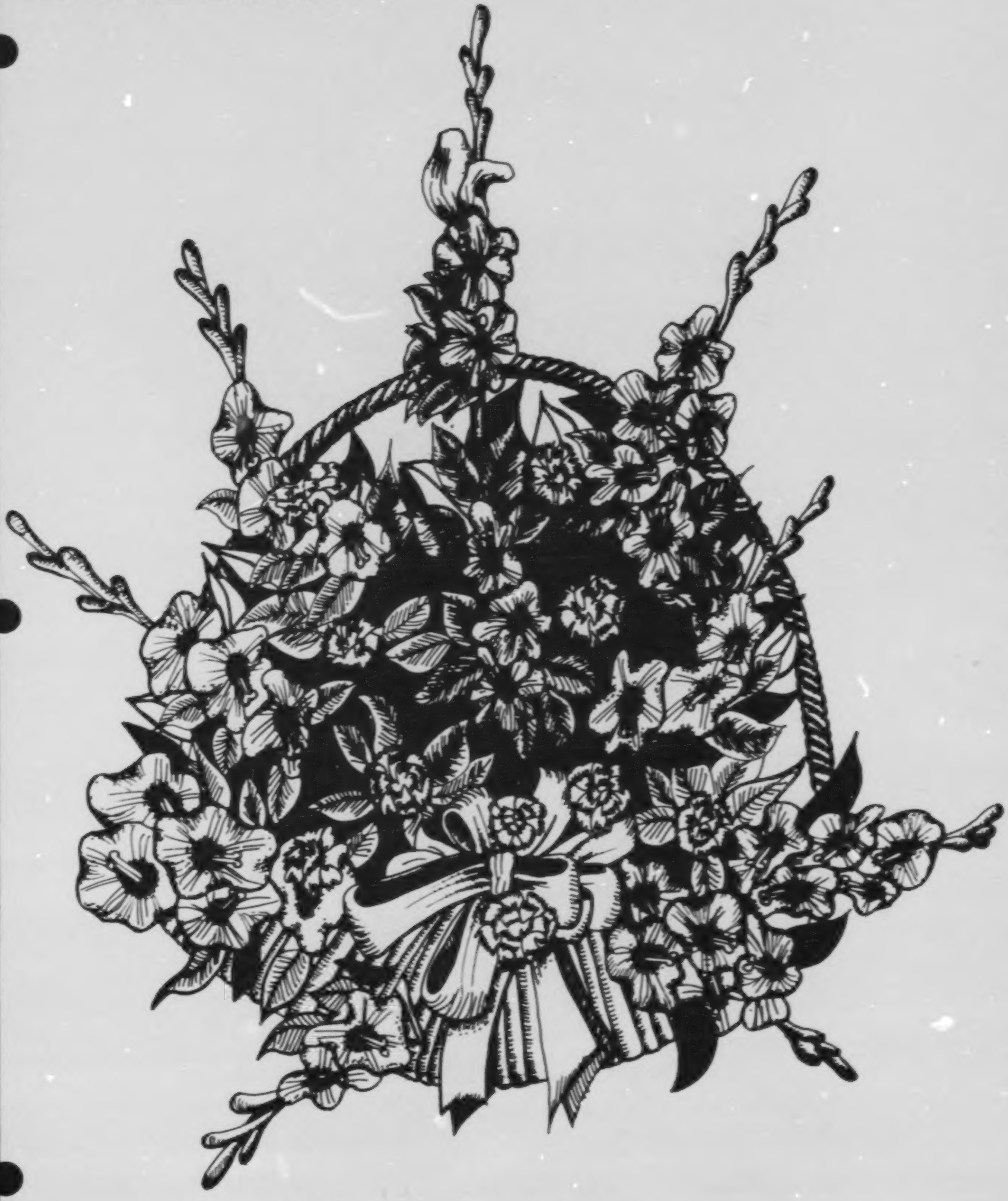
MASON'S EMBLEM



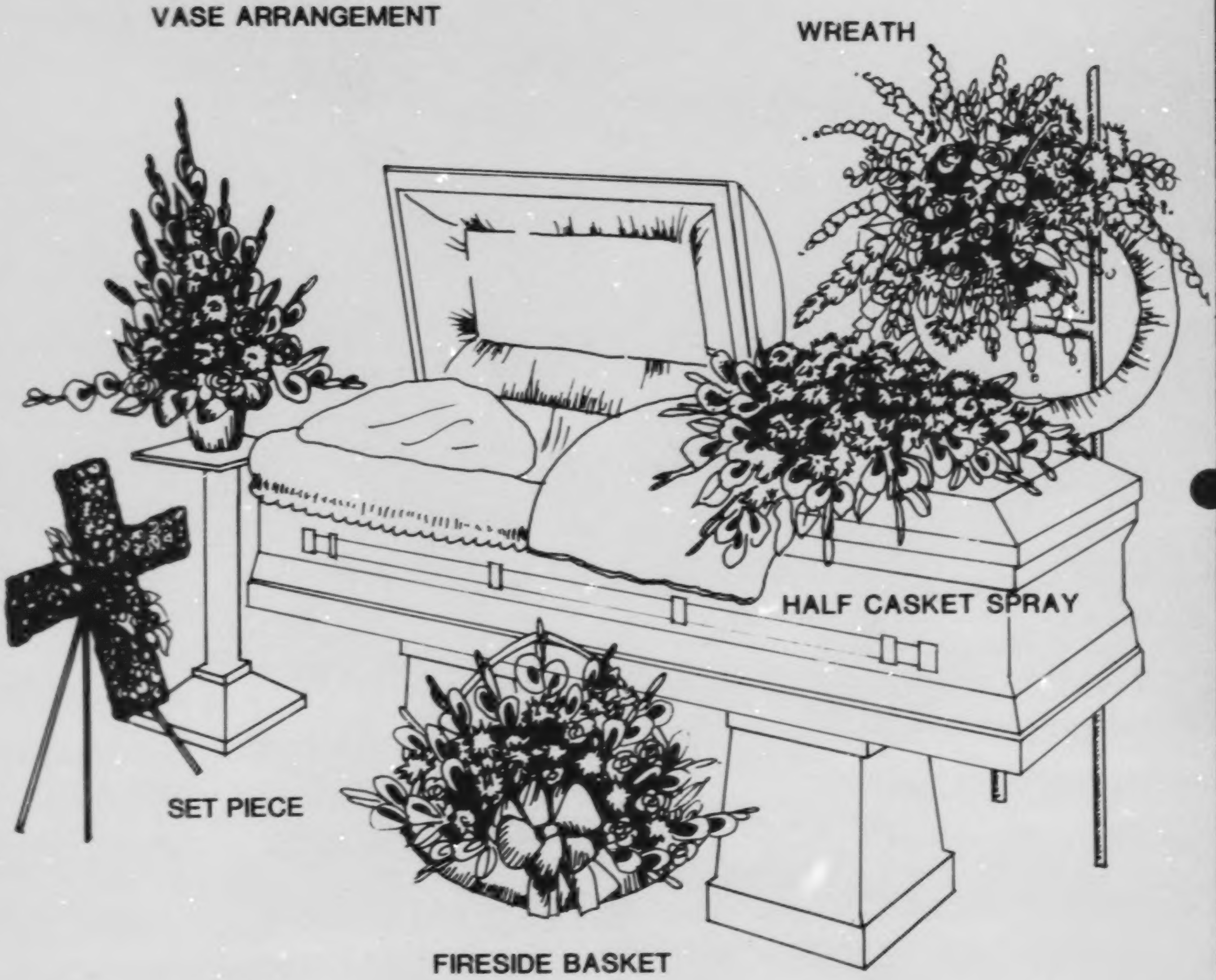
WREATH



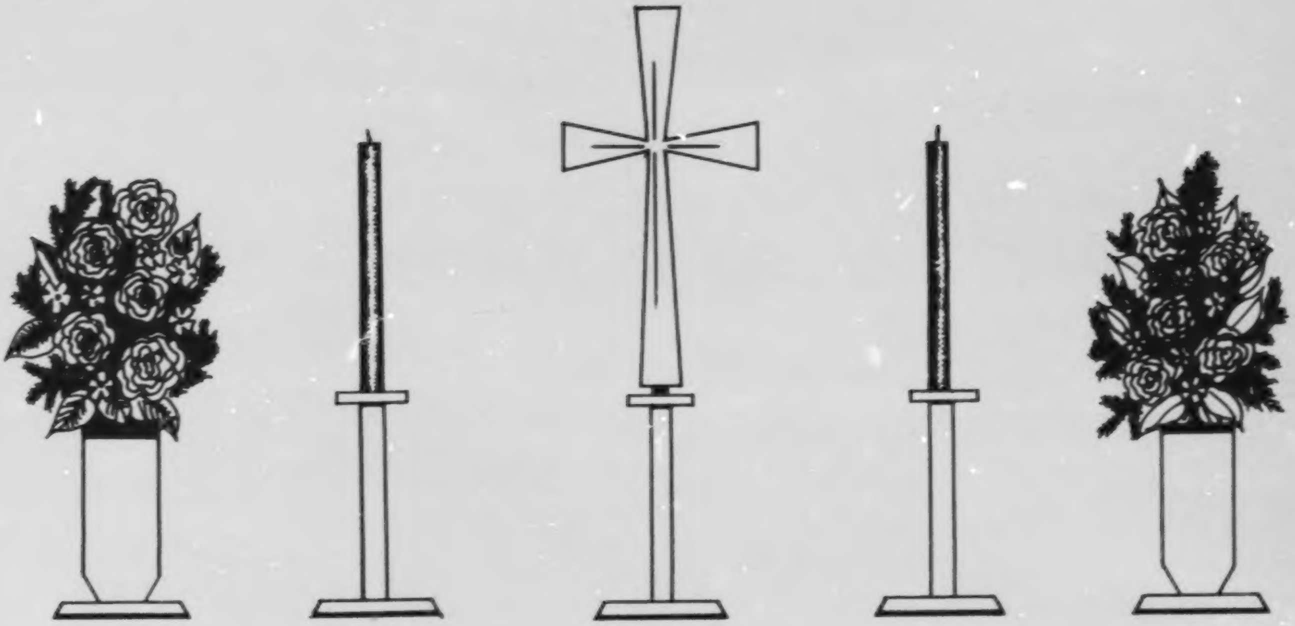
FIRESIDE BASKET



SET UP FOR FUNERAL PIECES


VASE ARRANGEMENT
WREATH
HALF CASKET SPRAY
SET PIECE
FIRESIDE BASKET

PLACEMENT OF FLOWERS ON THE ALTAR



TRANSPARENCY DISCUSSION GUIDE

DESIGNING FUNERAL ARRANGEMENTS

I. Transparency--CASKET BLANKET

A. The casket blanket is designed for the center of a closed casket. An adult-sized casket blanket is about five to six feet long.

B. The casket blanket is almost always ordered by the immediate family and is the most expensive funeral piece of all.

II. Transparency--HALF CASKET SPRAY

A. The half casket spray is designed for the foot of a half-opened casket. An adult-sized half casket spray is about three feet long.

III. Transparency--LID SPRAY

A. The lid spray is mounted on the lid of a full open casket, and "hangs" down over the casket. This spray is usually about five to six feet long for an adult-sized casket.

IV. Transparency--STANDING SPRAY

A. A standing spray is usually mounted on an easel and may be triangular or shield-shaped. These sprays are most commonly ordered by friends or business associates.

V. Transparency--SET PIECES

A. Set pieces are funeral designs of unique shape or size. Most set pieces are displayed in the casket or on an easel. Many organizations request special emblems which must be cut out of Styrofoam and intricately designed.

VI. Transparency--WREATH

A. Wreaths are the most commonly ordered set piece. The wreath is usually covered with ribbon or foliage, and a cluster of flowers is attached in a crescent shape.

VII. Transparency--FIRESIDE BASKET

A. Fireside baskets are arranged in oversized baskets that can be set on the floor near the casket. These baskets are usually sent by friends rather than relatives, and can be taken home by family members after the service.

VIII. Transparency--SET UP FOR FUNERAL PIECES

A. In most areas, funeral directors set up the funeral pieces themselves, however, the floral designer should be aware of the typical set up in case he or she is asked to perform this duty.

B. It is a good idea to spread smaller table arrangements and potted plants around the room to provide a warmer, friendlier atmosphere and to reduce congestion near the casket.

IX. Transparency--PLACEMENT OF FLOWERS ON THE ALTAR

A. Altar flowers should always be arranged in liners that will fit into the altar vases provided.

B. Altar flowers are usually placed on the ends of the altar, but may also be placed between the candles and the cross. The most important rule to follow when arranging altar flowers is to keep the top of the design below the top of the cross.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

DESIGNING FUNERAL ARRANGEMENTS

SHORT ANSWER:

1. List the names and uses of the 3 types of casket sprays.

   a. Casket blanket. Designed for the center of a closed casket.

   b. Half casket spray. Designed for the foot of a half-opened casket.

   c. Lid spray. Mounted on an open casket lid to hang over the casket.

2. What are set pieces? Give 3 examples.

   Any funeral design of novel or unique shape or size.

   Examples:

   a. Heart
   b. Wreath
   c. Emblem

3. Explain the meaning of "Please Omit."

   An expression used in obituary notices by the family to ask for donations to charities rather than sending flowers.

4. List 4 types of specific information needed on a funeral order.

   a. Age of the deceased

   b. Sex of the deceased

   c. Time and place of the funeral

   d. Relationship of the customer to the deceased

5. Name 3 do's and 3 don't's for funeral flowers at the church or synagogue.

   a. Do:

      1. Harmonize the colors of the arrangment with the colors of the church or synagogue.
      2. Arrange altar flowers in liners that fit into the altar vases.
      3. Contact the church or synagogue to find out what (if any) types of floral decorations are allowed.

b. Don't:

   1. Crowd flowers onto a small altar.
   2. Allow any flowers to touch or cover the cross.
   3. Arrange altar flowers to reach higher than the cross.

6. List the 4 things to consider when choosing the flowers for a funeral design.

   a. Customer preference.
   b. Keeping quality.
   c. Biggest showing for the least money.
   d. Colors already used in other pieces.

7. Name 3 do's and 3 don't's for designing flowers for the funeral home.

   a. Do:

      1. Check containers and casket saddles for leaks before arranging in them.
      2. Call the funeral home if a delivery is going to be late.
      3. Include a description of the funeral piece on the back of the card.

   b. Don't:

      1. Fill containers completely with water.
      2. Use papier-mache containers for arrangements to be taken hom by family members.
      3. Make unnecessary phone calls to the funeral home; check obituary notices first.

8. Briefly describe the general steps in constructing a funeral piece.

   a. Construct the foundation
   b. Establish the foliage background
   c. Wire flowers
   d. Establish the main lines of the design
   e. Fill in the design
   f. Establish the focal point

TRUE OR FALSE:

True 1. Flowers should never be used behind the cross in a church or synagogue.

False 2. Emblems are the most commonly ordered funeral pieces.

True 3. The age and sex of the deceased are important information on a funeral order.

False 4. A vase arrangement is the same as a table arrangement.

False 5. picks are used only for flowers arranged in a styrofoam foundation.

False 6. Fireside baskets are set next to the fireplace in the funeral home.

True 7. If the card on the funeral piece reads nieces and nephews, the ribbon should read aunt or uncle.

UNIT M: RETAIL FLORICULTURE

PROBLEM AREA: DESIGNING HOLIDAY ARRANGEMENTS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended time for teaching this problem area is throughout the school year in conjunction with the related holidays.

The estimated instructional time for this problem area is 10 to 12 days depending on how far the teacher wishes to go in developing holiday design skills. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets, laboratory exercises, transparency discussion guide, and test questions were developed by Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Janet L. Henderson, and Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Retail floriculture

II. Problem area: Designing holiday arrangements

III. Objectives: At the close of this problem area, students will be able to:

1. Name the major floral holidays.
2. Describe the types of floral products sold for each major floral holiday.
3. Identify steps for holiday preparation in the flower shop.
4. Design arrangements for the major floral holidays.
5. Create new and innovative holiday arrangements.

IV. Suggested interest approaches:

1. Ask the students to list the holidays they think are the busiest for most flower shops. Compile a list on the blackboard, and then ask the students what types of floral products are sold for each holiday.
2. Ask the students who have worked in flower shops to explain how their shops prepared in advance for specific floral holidays.

V. Anticipated problems and concerns of students:

1. What are the major floral holidays?
2. What types of floral products are sold for each holiday?
3. How should I plan ahead for increased holiday business?
4. When should I start planning for busy holidays?
5. How should I arrange the cooler for busy holidays?
6. How can I make sure everything gets done in time for a holiday?
7. What types of floral arrangements are most popular for each holiday?
8. How do I design holiday floral arrangements?

VI. Suggested learning activities and experiences:

1. A few days (or weeks) before each holiday, ask the students what types of floral arrangements they would like to make for that holiday. Have the students determine the flowers and supplies they will need for the arrangements.

2. Divide students into groups of 3 or 4 and have the groups compete to see which one can list the most holidays and the most creative design ideas for those holidays.

3. Take a study trip to attend an exposition, convention, or open house during holiday times to see a variety of holiday arrangements and to formulate ideas for classroom projects.

4. Have each student design a calendar of shop preparation for a specific holiday. Use these calendars for planning classroom laboratory exercises or holiday FFA sales.

5. Have the students look through various florist magazines and catalogs to gather ideas for holiday arrangements and to find holiday supplies and accessories they would like to use.

6. Have the students visit local flower shops at various holiday times to see the variety of floral products offered. Have each student tell the class about an exceptional or unusual product they saw.

7. Have the students make various types of floral arrangements for holidays throughout the year. Use the laboratory exercises in this problem area as a guide.

8. Provide students with a variety of flowers, foliages, containers, and accessories. Conduct a competition to see which students can design the most creative arrangements for a specific holiday.

VII. Application procedures:

1. Skills learned in preparing for holidays and designing holiday arrangements will aid students seeking employment as floral designers.

2. Creative ideas for holiday arrangements may be used by students at home or for FFA fund raising projects.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Administer a practical exam on the construction of a basic holiday design.

3. Evaluate student performance during laboratory exercises and other activities.

IX. References and aids:

1. Pfahl, Peter B. The Retail Florist Business. The Interstate Printers & Publishers, Inc., Danville, Illinois, 1983.

2. Stearns, Steve. "Organized for Action," *Flowers &*, January 1984, p. 51-3.

3. Hixson, Bill. *Christmas Decorations*. Information on obtaining this book is available from Hixson's Floral Design School, 14125 Detroit Ave., Lakewood, Ohio, 44107, 216-521-9843.

INFORMATION SHEET 1

MAJOR FLORAL HOLIDAYS

I. CHRISTMAS - December 25

A. The Christmas "season" is about 4 weeks long, beginning immediately after Thanksgiving.

B. Christmas is the biggest floral holiday of the year. Planning should begin during the slow summer months.

C. Popular arrangements: centerpieces with candles, wreaths, door swags, evergreen garlands.

D. Popular pot plants: poinsettias, chrysanthemums, gloxinias, azaleas, cyclamen, and Christmas cactus.

E. Popular flowers/foliage: pine, spruce, mistletoe, holly, carnations, roses.

F. Accessories: bells, candy canes, ornaments, pine cones, candles, fruit, ribbon.

II. EASTER - Sunday, date varies

A. The Easter rush is usually from Palm Sunday to Easter Sunday, with the Saturday before Easter as the busiest single day.

B. In most areas, Easter is the second biggest floral holiday; the weather usually has a great effect on the amount of business.

C. Popular arrangements: corsages made of orchids, roses, carnations, or gardenias.

D. Popular pot plants: Easter lilies, tulips, daffodils, chrysanthemums, azaleas, gardenias, hydrangeas, cinerarias, and calceolarias.

E. Popular cut flowers: carnations, roses, and snapdragons.

F. Accessories: colored eggs, rabbits, easter baskets, chicks, and crosses.

III. MEMORIAL DAY - May 30

A. Most customers order Memorial Day flowers in advance.

B. In some areas Memorial Day is a bigger floral holiday than Easter.

C. Popular arrangements: cemetery wreaths and vases.

D. Popular pot plants: geraniums, chrysanthemums, and bedding plants.

E. Popular cut flowers: peonies, snapdragons, gladiolas, and chrysanthemums.

IV. MOTHER'S DAY - second Sunday in May

A. Mother's Day is a popular floral holiday because everyone has a mother.

B. Most shops make their Mother's Day deliveries on Saturday, but remain open for cash-and-carry sales on Sunday.

C. Popular arrangements: corsages (made of orchids, gardenias, roses, camellias, or carnations), boutonnieres (men wear white boutonnieres if their mother is deceased, and colored boutonnieres if their mother is living), and centerpieces.

D. Popular pot plants: chrysanthemums, azaleas, hydrangeas, tulips, daffodils, hyacinths, and gardenias.

V. VALENTINE'S DAY - February 14

A. Valentine's Day orders are usually taken a week to a week and a half in advance. Deliveries are made on Valentine's Day.

B. Popular arrangements: corsages, bud vases, rose vases, novelty arrangements.

C. Popular pot plants: tulips, daffodils, hyacinths, azaleas, hydrangeas.

D. Popular cut flowers: roses and carnations, especially red, white, and pink.

E. Accessories: hearts, cupid, candy, love birds, lace, and novelty containers.

VI. THANKSGIVING - Thursday of the last week in November

A. Most Thanksgiving business comes from customers buying gifts for others.

B. Deliveries are usually made on the Wednesday before Thanksgiving.

C. Popular arrangements: centerpieces in fall colors, dried flower arrangements, cornucopia with flowers and fruit.

D. Popular pot plants: chrysanthemums.

E. Popular cut flowers: chrysanthemums, gladiolas, daisies, and dyed carnations.

F. Accessories: leaves, gourds, baskets, Indian corn, cornucopias, pilgrims, and turkeys.

INFORMATION SHEET 2

PREPARING FOR FLORAL HOLIDAYS

Floral holidays are an important part of a florist's business. A much larger volume of the florist's merchandise is sold at holidays than any other time. For this reason, it is very important that the florist prepare for the holiday rush far in advance. The following 4-week plan can be used to help the florist get ready for any hectic floral holiday.

Four Weeks in Advance:

1. Check last year's records to see how many wire orders, delivery orders, will calls, and cash-and-carry sales were made. Use this information to estimate the amount of sales you will have this year. Also check records to see how many and which types of flowers and supplies were needed.
2. Check with the wholesaler to get an idea of which flowers will be in abundant supply at good prices.
3. Order cut flowers and plants from the wholesaler on a tentative basis. The wholesaler will not be able to confirm your order until he/she receives the merchandise from the grower.
4. Start formulating ideas for specials and feature items with the help of the designers.
5. Set up a window display with the appropriate holiday theme. Decorate the entire shop to make it look festive.
6. Start making silk and dried arrangements and bows during slow periods of the day.

Three Weeks in Advance:

1. Contact the wholesaler to get a more definite estimate of what flowers and plants will be available, and what their prices will be.
2. Determine how many clerks, designers, and delivery persons will be needed and hire the necessary extra help. Put together a holiday work schedule so that all employees can make plans accordingly.
3. Clean and arrange the workroom in an efficient manner. Check to see that all supplies are available and ready to be used.
4. Clean the display cooler and arrange it to fit the most flowers. Decorate the cooler to go along with the holiday theme.
5. Begin grouping plants, dishgardens, artificial arrangements, and gift items into individual displays.

Two Week Countdown:

Days 14, 13, 12 - 1.) Shipments of green plants, flowering plants, dishgardens, and terrariums should start arriving from the wholesaler. Decorate these items with foil and bows, then display them in a feature location.
2.) Conduct short training sessions to explain store procedures to the extra employees hired.

Day 11 - 1.) Meet with employees and go over plans for handling the holiday rush.
2.) Begin contacting the wholesaler on a daily basis to find out flower availability; be ready to make adjustments in the original flower order.

Day 10 - Shipments of cut flowers will begin to arrive from the wholesaler. Have clean buckets with preservative water ready. Clean the flowers as they arrive and get them into the cooler.

Day 9 - Start filling containers with foam. Check the customer orders collected so far to determine the approximate number of feature arrangements needed.

Day 8 - 1.) Start greening the containers for the feature arrangements.
2.) Make any orchid arrangements that have been ordered; the flowers will remain fresh as long as the arrangements are kept in the cooler.

Day 7 - 1.) Separate customer orders by type of arrangement, delivery or will call, delivery area, and "hold" items (those with a delivery date after the holiday).
2.) From this day on, try to have all customer orders for the following day ready by closing time.
3.) Clean and straighten the displays and cooler.

Days 6, 5 - 1.) More shipments of cut flowers will be received; clean and refrigerate them appropriately.
2.) Start mass producing the feature arrangements and display them in the cooler.

Day 4 - 1.) Start making custom arrangements according to the orders.
2.) Begin tagging plants and arrangements with cards and customer orders and place them in the storage cooler and holding area.
3.) Group the orders in the holding area according to delivery date.

Day 3 - 1.) Continue making custom arrangements and determine whether more feature or artificial arrangements are needed.
2.) Sort and route all deliveries for day 2.

Day 2 - 1.) All delivery vehicles should be out on the road.
2.) Make more feature arrangements as needed.
3.) Determine which items are in abundant supply and instruct salespersons to push these items.
4.) Sort and route all deliveries for day 1.

Day 1 - 1.) All delivery vehicles should be out on the road.
2.) All salespersons should help customers and answer phones.
3.) All designers should work on last minute orders and arrangements to keep the display cooler full.
4.) At the end of the day hold a meeting with the employees to find out what problems occurred and how these could have been solved. Write these problems and solutions down and include them with the holiday records for next year's use.

INFORMATION SHEET 3

HELPFUL HOLIDAY BUSINESS PRACTICES

1. Try not to accept wedding orders during holidays.
2. Make all corsages and boutonnieres ahead of time. Put them in a plastic bag and keep them in the cooler.
3. Whenever possible, arrange to pool deliveries with other florists in the area.
4. Assign a driver and a jumper to each delivery vehicle. The jumper is responsible for finding the packages in the truck and delivering them to the door.
5. Keep one delivery truck on reserve, if possible, in case of emergencies or last minute wire orders.
6. Designate one person to be in charge of each service (phones, sales counter, delivery, wire orders, etc.).
7. When flowers are received, contact the wholesaler and let him/her know if you are happy or unhappy with the merchandise.
8. Allow the manager to handle all customer complaints.
9. Keep a record of all customer complaints and returns to make improvements for next year.
10. Post signs near the telephones to keep employees from making personal calls.
11. Deliver plants one or two days before the holiday, flowers on the holiday.
12. Have all employees wear name tags.
13. Encourage customers to take the merchandise with them instead of having it delivered.
14. Do not take orders for special deliveries.
15. Encourage customers to pay for their flowers when they place the order.
16. Do not accept wire orders for below $10.00. (Shops will vary on this minimum.)

LABORATORY EXERCISE 1

MAKING A CHRISTMAS WREATH

PURPOSE: The purpose of this laboratory exercise is to develop the student's skills for constructing evergreen wreaths on various types of frames.

MATERIALS:

1. straw wreath frame
2. metal wreath frame
3. wire coat hanger
4. greening pins
5. spool wire/no. 24 wire
6. wire cutters
7. clippers
8. ribbons/bows
9. evergreen material
10. accessories (pine cones, candy canes, etc.)

PROCEDURES:

I. Straw Frame wreath-

1. Use evergreens that have been bound into roping.

2. Starting on the outside edge of the wreath frame, wrap the roping closely around the side and secure it with one or two greening pins every five inches.

3. Pin the roping underneath some of the evergreens so that the greening pins don't show.

4. Continue wrapping and pinning the evergreens along the top, and then the inside, of the wreath.

5. Use spool wire or no. 24 wire to bind the roping onto the wreath in several locations.

6. Attach a bow and streamers to the wreath with no. 24 wire.

7. Use no. 24 wire to attach accessories, if desired.

II. Metal frame wreath-

1. Cut the evergreens into 3-4 inch pieces and group them into small clusters.

2. Fit one cluster of evergreens between two of the metal prongs of the frame.

3. Bend the prongs over the stems of the evergreens to hold the cluster in place.

4. Add a second cluster of evergreens by fitting the cluster between the next set of prongs below the stems of the first cluster.

5. Overlap about 1/3 of the second cluster over the first cluster to cover the stems. Bend the prongs over the stems of the second cluster to hold it in place.

6. Continue circling the wreath, adding clusters of evergreens until the wreath is full.

7. Attach a bow and streamers at the point where the last cluster was added.

8. Use no. 24 wire to add accessories, if desired.

III. Coat hanger frame-

1. Bend a coat hanger to form a circle.

2. Cut the evergreens into 3-4 inch pieces and group them into small clusters.

3. Start at the top of the hanger, and use a spool of wire to wrap the stems of one cluster onto the frame.

4. Keep the hanger flat against the table and wrap the wire around the stems 2-3 times, until secure. Do not cut the wire.

5. Overlap a second evergreen cluster over the stems of the first and continue with the same wire to secure the cluster to the frame.

6. Continue adding evergreen clusters around the frame until it is full.

7. Attach a bow at the top to cover the hook.

8. Use no. 24 wire to add accessories, if desired.

NOTE: Christmas wreaths may also be made using several mixed types of evergreens, plastic evergreens, plastic fruit, pine cones, or dried materials. They may also be made in oval or square shapes for variety.

LABORATORY EXERCISE 2

MAKING A CHRISTMAS DOOR SWAG

PURPOSE: The purpose of this laboratory exercise is to develop the student's skills for constructing an evergreen door swag.

MATERIALS:

1. 2"x4"x6" Styrofoam block
2. green florist's foil
3. pipe cleaners
4. clippers
5. knife
6. long- and short-needled evergreens
7. bow
8. accessories

PROCEDURES:

1. Cover the Styrofoam block with a piece of green florist's foil.

2. Bend a pipe cleaner and insert both ends slowly, but firmly into the 2"x4" end of the block to form a hook.

3. Cut a long piece of long-needled evergreen to form the longest piece of the lower half of the swag. (The length of this stem will depend on the desired size of the swag.)

4. Use a knife to sharpen the stem of the evergreen piece. Insert the stem at the center of the block's base.

5. Insert a pipe cleaner into the base of the block, near the evergreen stem. Wrap the pipe cleaner around the stem to help hold the stem in place.

6. Insert 2 medium-length, long-needled evergreens into the top corners of the block. (Remember to sharpen the tips of the stems first.) The 3 stems should now form a slim triangle; symmetrical or asymmetrical.

7. Add several varying lengths of long needled evergreens around the sides of the block to complete the outline of the design.

8. Fill in the design with short-needled evergreens. Stems should get continually shorter as they reach the center. All stems should radiate from the center of the block. Be sure to mix the 2 types of evergreens to give a smooth transition from the edges to the center.

9. Stems at the center of the block should be almost vertical and progress toward more horizontal placements along the edges.

10. Use bows, pine cones, berries, or other accessories to develop a focal point near the center of the swag.

LABORATORY EXERCISE 3

MAKING AN EVERGREEN GARLAND

PURPOSE: The purpose of this laboratory exercise is to develop the student's skills for constructing an evergreen garland.

MATERIALS:

1. evergreens
2. spool wire
3. clippers
4. wire cutters
5. ribbon
6. accessories

PROCEDURES:

1. Cut the evergreens into 10-12 inch pieces.

2. Group 3 or 4 pieces with stems together.

3. Use the spool wire to bind the stems. Tightly wrap the wire around the stems 2-3 times, until secure. Do not cut the wire.

4. Group 3 or 4 more pieces of evergreens together and lay the cluster so that it overlaps about 1/3 of the bound stems.

5. Pull the wire from the spool about 2/3 of the way down the second cluster and bind the stems together tightly; wrapping 2-3 times.

6. Continue adding groups of evergreens in this manner until the garland is close to the desired length. Note: If the desired garland is to be wide in the middle and tapered at the ends, then use progressively thicker groups of evergreens until reaching the center, and again progress to thinner groups at the other end. For a garland of uniform width, use evergreen clusters of the same size throughout.

7. To end the garland, bind a cluster of evergreens over the last group, but reverse the direction of the stems to provide a tip. Cover the stems of this cluster by binding a few small pieces of evergreens on top.

8. Trim any long, spindly pieces of evergreen from the garland.

9. Decorate the garland with ribbons and accessories, if desired.

LABORATORY EXERCISE 4

MAKING A HOLIDAY CENTERPIECE

PURPOSE: The purpose of this laboratory exercise is to develop the student's skills for constructing a basic centerpiece that can be used for many different holidays.

MATERIALS:

1. low oval, round, or rectangular container
2. floral foam or Styrofoam
3. floral adhesive tape
4. large single candle, or 2-3 tapered or votive candles
5. candle holders or wooden picks
6. green florist's foil
7. flowers
8. foliage
9. florist knife
10. accessories (depends on the holiday)

PROCEDURES:

1. Wrap the Styrofoam in green florist's foil as a safety precaution when using candles with Styrofoam.
   or:
   Place a saturated block of floral foam in the container and secure it with floral adhesive tape.

   (Select the appropriate foundation based on the types of flowers and foliage being used.)

2. Place the candles in the candle holders (for tapered and votive candles) or attach 3-4 small wooden picks to the base of the candle with adhesive tape (for large single candles).

3. Insert the candle holders into the foam in the desired locations. Avoid placing candles parallel and at the same height as each other.

4. Insert the 4 main pieces of foliage into the foam; a long piece on each end, a short piece on each side, to form the outline of the arrangement. Each of the four pieces of foliage should lie almost flat against the table top.

5. Add some smaller pieces of foliage to fill in the outline. Then add more foliage around the candles to help smooth the transition.

6. Add the flowers and/or accessories; clustering most of them near (but not above) the candles, and dispersing a few closer to the edges.

7. Ribbon streamers may be attached to wires and inserted so that they extend along the length of the arrangement.

NOTE: The candles should be the focal point of this type of arrangement. Avoid using too many flowers or accessories that will distract from the candles.

LABORATORY EXERCISE 5

MAKING A THANKSGIVING CORNUCOPIA ARRANGEMENT

PURPOSE: The purpose of this laboratory exercise is to develop the student's skills and creativity for constructing Thanksgiving arrangements.

MATERIALS:

1. cornucopia
2. floral foam
3. green florist's foil
4. florist wire
5. florist knife
6. fall flowers
7. foliage
8. accessories (gourds, Indian corn, fruit, etc.)

PROCEDURES:

1. Wrap the saturated foam in green florist's foil.

2. Place the foam snugly inside the cornucopia.

3. Insert two wires from the bottom, through the wicker, up, over the foam, and back down through the wicker, to hold the foam in place.

4. Insert 2-3 pieces of foliage into the foam so that it lays flat against the table at about 2/3 the length of the cornucopia.

5. Wire the accessories and insert them into the foam so that they appear to be spilling out of the cornucopia. Don't use too many accessories, and leave spaces between them for flower placements.

6. Use fall colored flowers, dried materials, and additional foliage to fill in the cornucopia.

LABORATORY EXERCISE 6

MAKING A FLORAL EASTER BASKET

PURPOSE: The purpose of this laboratory exercise is to develop the student's skills and creativity for constructing Easter arrangements.

MATERIALS:

1. Easter basket
2. Easter grass
3. floral foam
4. small plastic container
5. florist knife
6. spring flowers
7. foliage
8. ribbon
9. accessories (eggs, chicks, rabbits, etc.)

PROCEDURES:

1. Fill the Easter basket about 1/2 full of Easter grass.

2. Fit the container into the basket and place a saturated piece of foam in the container.

3. Hide the container with more Easter grass.

4. Decorate the basket handle with ribbon.

5. Insert 5 pieces of foliage into the foam to form the outline of the arrangement. Place one piece of foliage vertically, in the center of the basket. The height should be at least 1 1/2 inches below the handle, so that the basket can still be carried. Place the other 4 pieces of foliage horizontally, to reach and cover the edges of the basket.

6. Fill in the outline with a few light pieces of foliage.

7. Add the flowers to form a nice rounded look. Avoid using too many flowers. The arrangement should look light and airy. If delicate flowers and foliage are used, you should be able to see through the arrangement.

8. Add accessories to make the arrangement look like a real Easter basket. Most importantly, be creative.

LABORATORY EXERCISE 7

MAKING A VALENTINE'S DAY ROSE ARRANGEMENT

PURPOSE: The purpose of this laboratory exercise is to develop the student's skills in constructing popular Valentine's Day arrangements.

MATERIALS:

1. budvase
2. large vase
3. chicken wire
4. floral adhesive tape
5. florist knife
6. wire cutters
7. 12 roses (may be substituted with other flowers)
8. foliage
9. filler material (ex. babies breath)
10. ribbon

PROCEDURES:

I. Budvase-

1. Fill the budvase 1/2 full with preservative water.
2. Cut a piece of foliage to 1 to 1 1/2 times the vase height, and place it in the vase.
3. Add 2-3 additional pieces of foliage at varying heights.
4. Place 1-3 roses in the vase at staggered heights. The tallest flower should almost reach the height of the tallest foliage.
5. Add 1-2 small pieces of filler material and attach a bow at the lip of the vase.

NOTE: Budvases are very popular items on Valentine's Day; a good floral designer should be able to make one in less than a minute and a half.

II. Rose Arrangement-

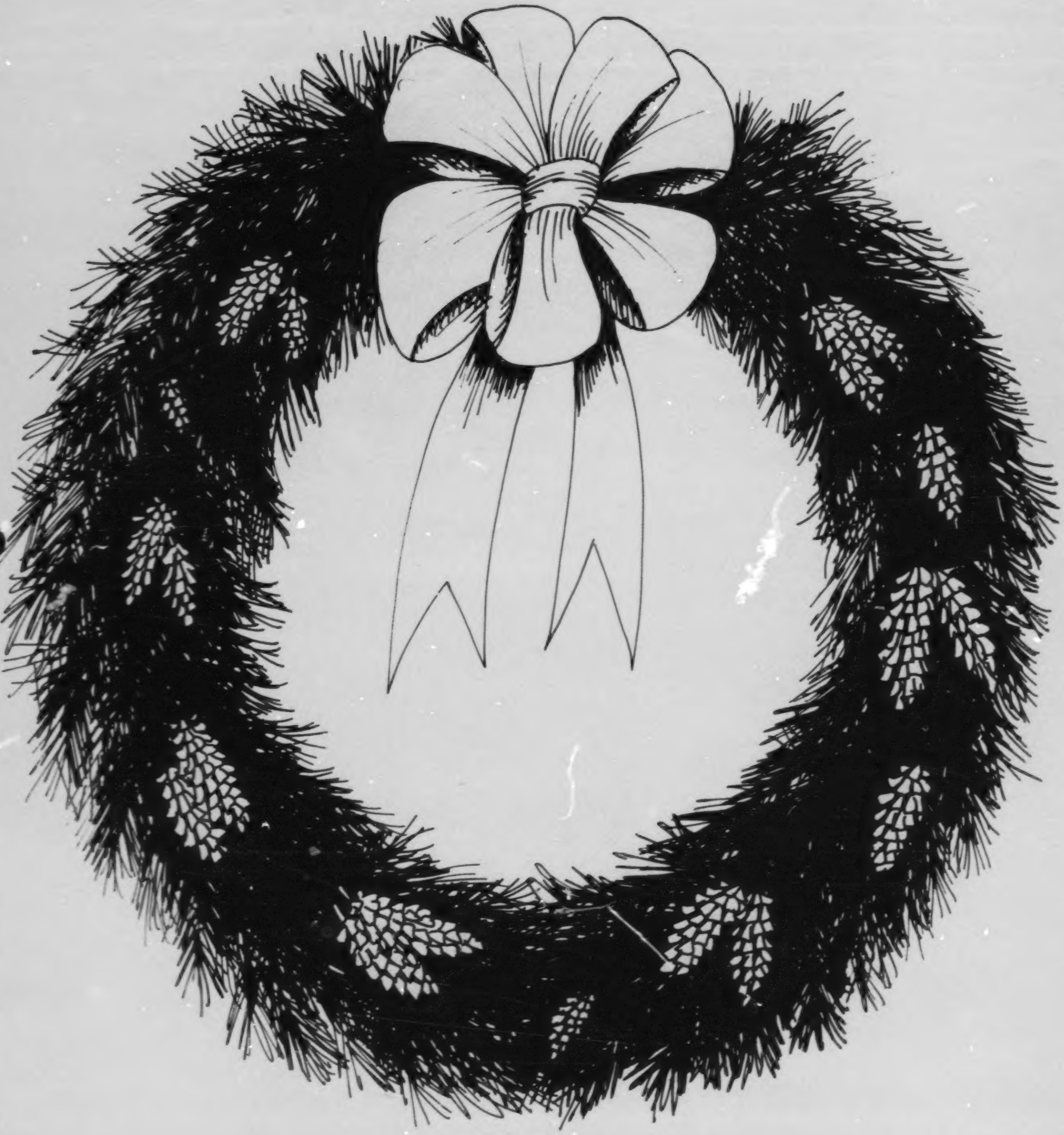
1. Cut a piece of chicken wire about 10x12 inches.
2. Fold the chicken wire loosely and fit it into the top of the vase. Use adhesive tape to make it secure.
3. Use several pieces of foliage to form a rounded outline for the arrangement.
4. Insert the tallest rose vertically into the vase. For best support, insert the rose until it reaches the bottom of the vase.
5. Insert 4 shorter roses diagonally around the rim of the vase.

6. Use the remaining roses to fill in the areas between the top and bottom flowers. Leave plenty of room around each rose for them to open up.

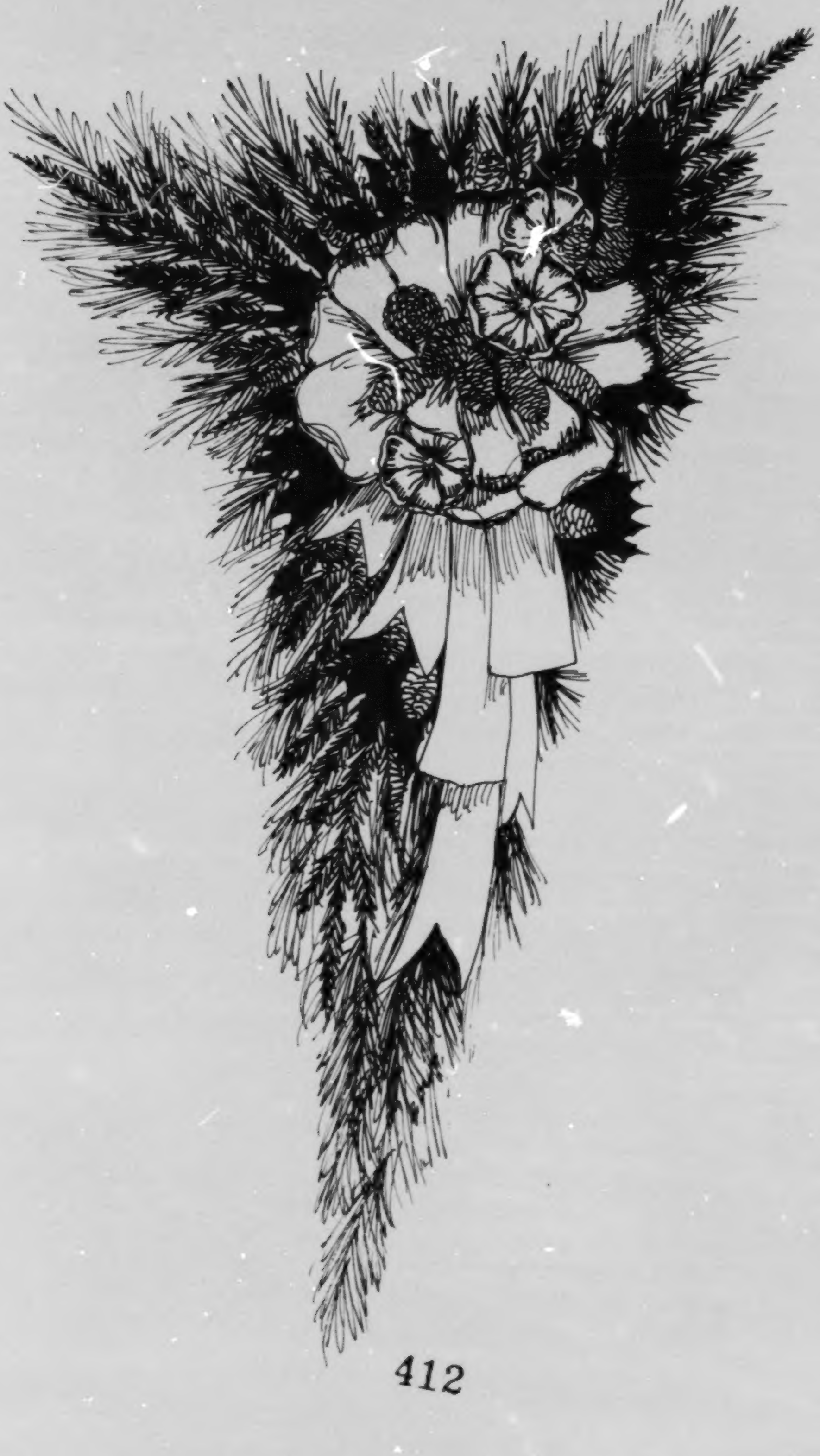
7. Add more foliage to cover the stems and mechanics. Add some filler material to lighten the arrangement.

8. Use no. 9 ribbon to make a bow and streamers. Attach them to the best side of the arrangement at the rim of the container.

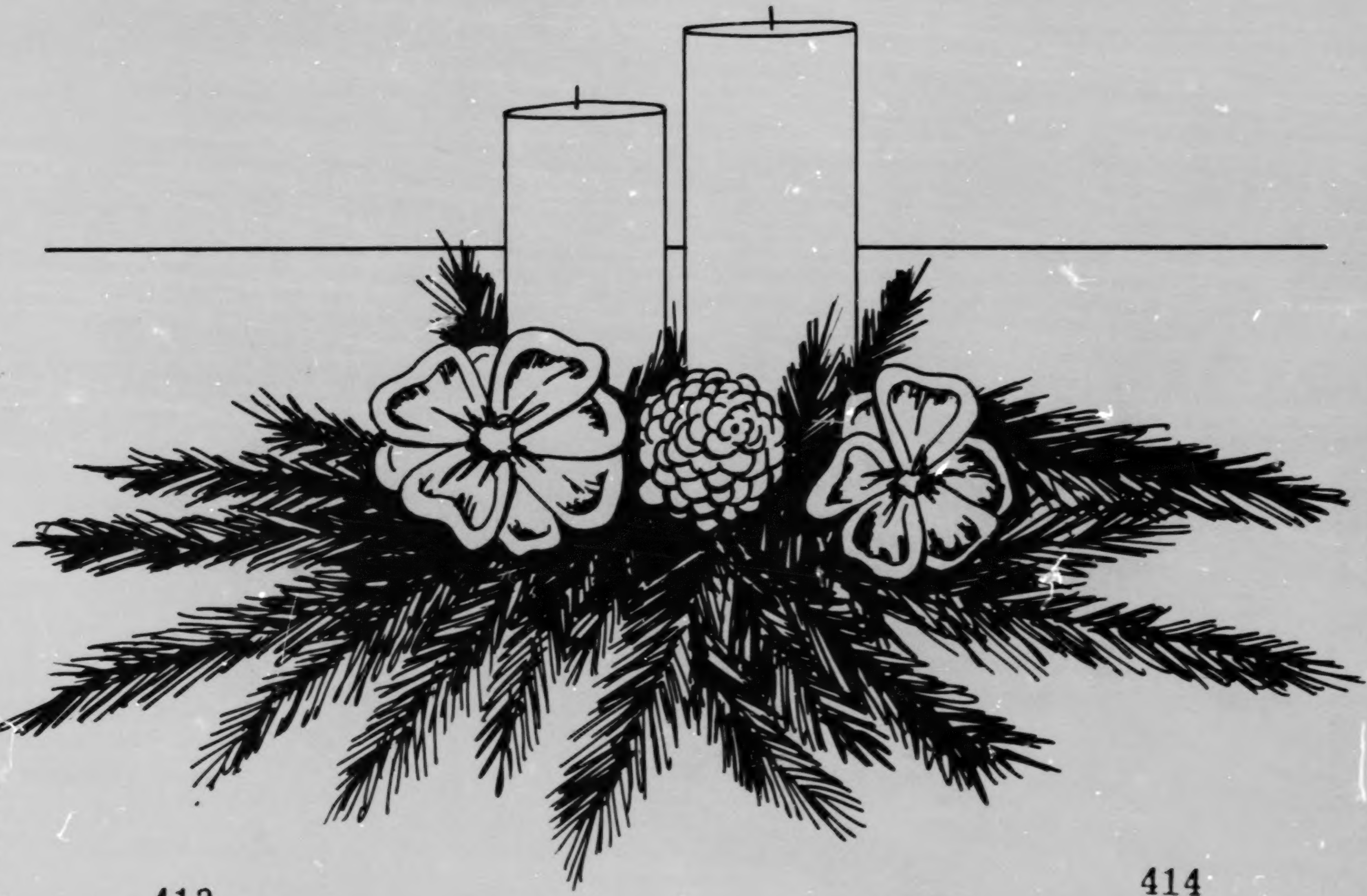
CHRISTMAS WREATH



CHRISTMAS DOOR SWAG



HOLIDAY CENTERPIECE



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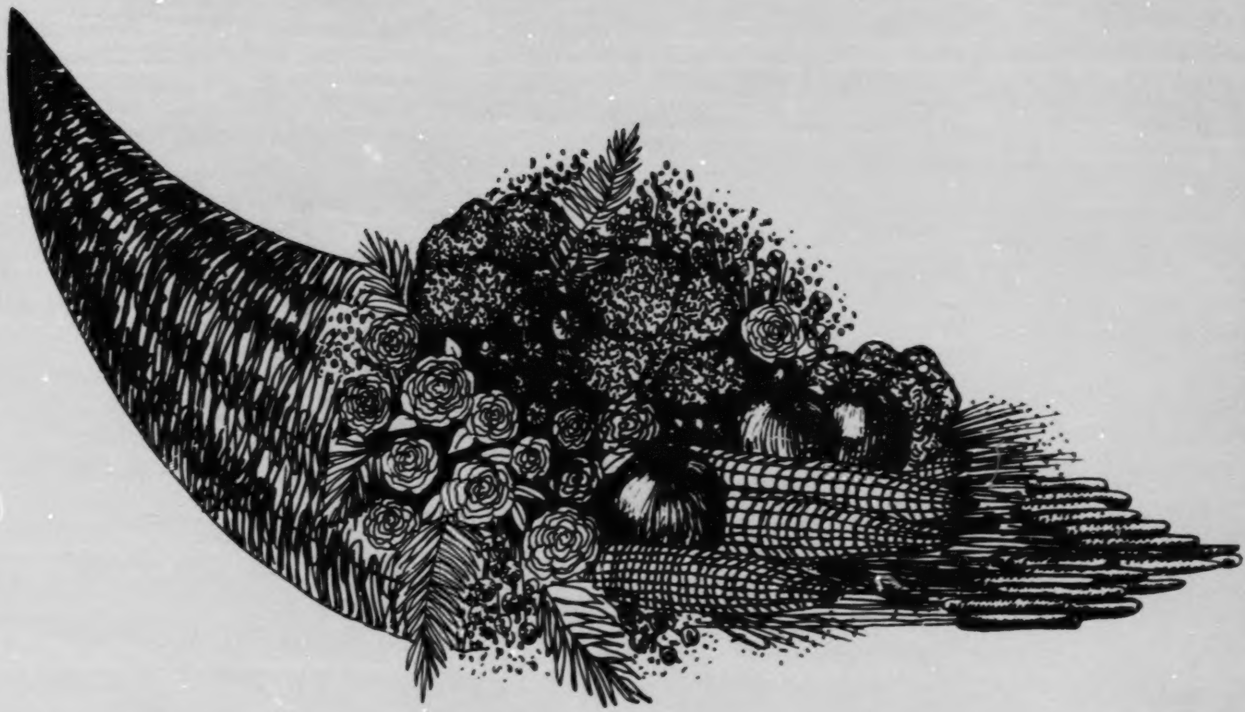
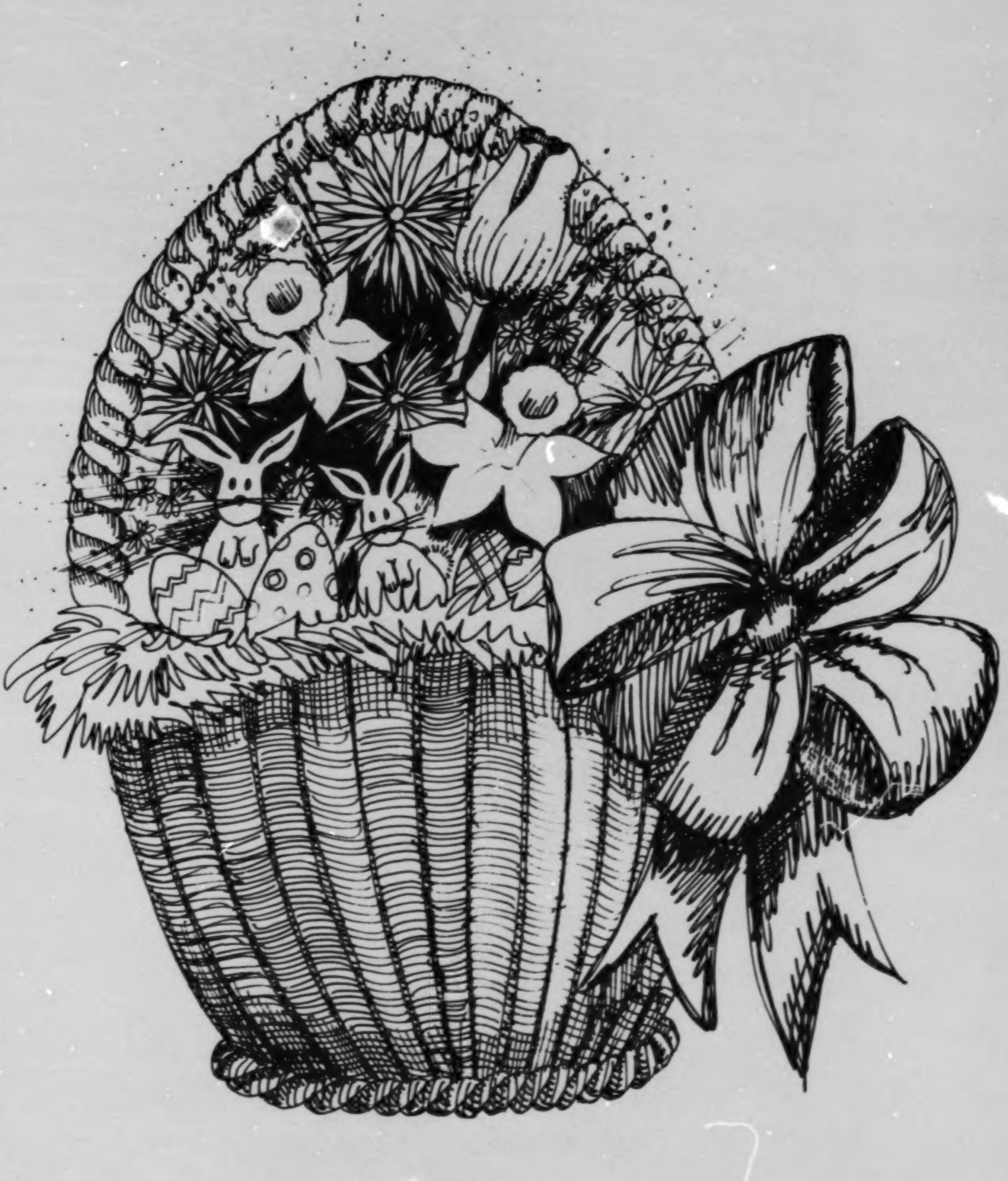
THANKGIVING CORNUCOPIA



FLORAL EASTER BASKET



TRANSPARENCY DISCUSSION GUIDE

DESIGNING HOLIDAY ARRANGEMENTS

I. Transparency--CHRISTMAS WREATH

A. Wreaths may be constructed on a variety of frame types. Straw, wire, and Styrofoam frames are used most commonly.

B. Accessories may be used to portray a particular mood or feeling within the wreath. For example, candy canes, shiney ornaments, and gingerbread men could be used to make a childlike or whimsical wreath.

II. Transparency--CHRISTMAS DOOR SWAG

A. Door swags may be constructed into several shapes, however all swags should be long and lean to repeat the narrow lines of the door.

B. When constructing the door swag, all stems should be inserted so they appear to radiate from the center of the swag.

III. Transparency--HOLIDAY CENTERPIECE

A. The holiday centerpiece is intended for use in the center of a table. The arrangement should repeat the shape of the table it is placed on. For example, a round table requires a round centerpiece; a rectangular table requires a long oval centerpiece.

B. Various types of candles may be used in the holiday centerpiece. The candles should be the focal point of the arrangement.

C. It is important to keep the flowers and foliage of a centerpiece several inches below the candles to eliminate fire hazards.

IV. Transparency--THANKSGIVING CORNUCOPIA

A. The Thanksgiving cornucopia is a simple but festive design to arrange. Fall colored flowers, dried plant materials, and various fruits, gourds, and accessories are combined in the cornucopia to portray a festive feeling.

V. Transparency--FLORAL EASTER BASKET

A. The floral Easter basket should be filled with small, fine-textured plant materials to form a very light and airy arrangement. If delicate flowers and foliage are used, you should be able to see through the arrangement.

B. Accessories such as Easter grass, eggs, chicks, and rabbits should be used to convey the Easter theme. It is important to keep the accessories in proportion with the overall size of the floral arrangement and basket.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

DESIGNING HOLIDAY ARRANGEMENTS

SHORT ANSWER:

1. List the 6 major floral holidays.

a.	Christmas	d.	Mother's Day
b.	Easter	e.	Valentine's Day
c.	Memorial Day	f.	Thanksgiving

2. List one popular type of floral arrangement and one popular pot plant for each of the major floral holidays.

Holiday	Arrangement	Pot Plant
a. Christmas	Wreath	Poinsettia
b. Thanksgiving	Cornucopia	Chrysanthemum
c. Easter	Corsages	Easter Lily
d. Mother's Day	Corsages	Azalea
e. Memorial Day	Cemetery Vases	Geraniums
f. Valentine's Day	Rose Vases	Tulips

3. Name 3 ways a florist can start preparing for a floral holiday 4 weeks in advance.

   a. Check last year's records to see how many, and which types of sales were made. Use this information to start planning the flowers and supplies needed.

   b. Set up the display window and decorate the shop according to the holiday theme.

   c. Start making artificial holiday arrangements during slow periods of each day.

4. Name 3 important jobs that should be done during the last 3 days before a holiday.

   a. Make all of the custom arrangements according to customer orders.

   b. Sort and route all deliveries for the following day.

   c. Tag plants and arrangements as they are completed and group them in the holding area.

5. Think of a creative type of floral arrangement to be sold for Halloween or St. Patrick's Day and describe the arrangement in detail. (Include style, size, colors, container, flowers, foliages, and accessories in your description.)

   Answers will vary.

TRUE OR FALSE:

False 1. Pooling deliveries with competing florists during peak holiday times is not a good idea.

False 2. Salespersons should encourage customers to pay for their order when they come in to pick them up.

True 3. Holiday plants should be delivered one or two days before the holiday.

False 4. Valentine's Day is the second biggest floral holiday.

True 5. Florists should not accept special delivery orders during holidays.

UNIT M: RETAIL FLORICULTURE

PROBLEM AREA: DESIGNING DISHGARDENS AND TERRARIUMS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with beginning or advanced students in vocational agriculture/horticulture programs. This problem area may be taught at anytime during the school year. It is recommended that this problem area follow a unit on propagation, to provide materials for terrariums and dishgardens.

The estimated instructional time for this problem area is 2 to 4 days depending on how far the teacher wishes to go in developing construction of terrariums and dishgarden skills.

Instructors are encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets, laboratory exercises, transparency discussion guide, and test questions were developed by Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Janet L. Henderson, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

The art work in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Retail floriculture

II. Problem area: Designing dishgardens and terrariums

III. Objectives: At the close of this problem area, students will be able to:

1. Select compatable plant combinations for dishgardens and terrariums.
2. Construct a dishgarden and terrarium.
3. Maintain dishgardens and terrariums.
4. Describe the historical background of terrariums.

IV. Suggested interest approaches:

1. Ask the students if they know who invented the first terrarium and what it was originally called.
2. Show the class VAS slideset or slidefilm 647 - Planting a Terrarium and How to Keep It.
3. Show the class several examples of containers, and have them guess which ones would be suitable for use as a terrarium or dishgarden.
4. Ask the students if any of them have a terrarium or dishgarden at home, and ask the following questions:
    1. Was your terrarium purchased by a member of the family or was it a gift?
    2. What type of plants are in your terrarium or dishgarden?
    3. How long have you owned your terrarium?
    4. How can you tell if your terrarium or dishgarden is in good condition?

V. Anticipated problems and concerns of students:

1. What types of containers can I use for a terrarium or dishgarden?
2. What tools do I need to plant a terrarium or dishgarden?
3. What type of soil do I need for my terrarium or dishgarden?
4. How do I plan my design?
5. What assessories can I use?

6. What can affect the growth of my plants in a terrarium or dishgarden?

7. What type of plants grow in a terrarium?

8. How often must I water my terrarium or dishgarden?

9. What can I do if my plants outgrow the container?

10. Who invented the terrarium?

11. How do I maintain my terrarium?

VI. Suggested learning activities and experiences:

1. Discuss the historical background of terrriums using Information Sheet 1.

2. Visit a florist or garden center to view examples of dishgardens and terrariums.

3. Have students locate containers and accessories suitable for a dishgarden at home, so they will have materials to construct one in class.

4. Utilizing Laboratory Exercise 2 and Transparency 3, have the student make their own terrarium tools.

5. Set several examples of terrariums in the classroom and have the students identify any problems using Laboratory Exercise 5.

6. Show slides or pictures utilizing terrariums and dishgardens in the following situations: home, work, hospital, new business, and sympathy arrangements.

7. Have students construct a terrarium using Laboratory Exercise 3.

8. Have students construct a dishgarden using Laboratory Exercise 4.

9. Plan a terrarium or dishgarden design on paper before picking out plants, utilizing Information Sheet 3.

VII. Application procedures:

1. Knowledge and skills involving terrariums and dishgardens will be an asset to those who wish to seek employment in a retail flower shop or plant store.

2. The students may apply their skills in constructing terrariums and dishgardens for use in a FFA or Horticulture Club fund raising or community service project.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.
2. Evaluate Laboratory Exercises.

IX. References and aids:

1. Vocational Agriculture Service, University of Illinois, 1401 South Maryland Drive, Urbana, Illinois 61801.
    a. Slidefilm or slide set 647 - Planting a Terrarium and How to Keep It.
2. Hemp, Paul E. 50 Laboratory Exercises for Vocational Ornamental Horticulture Students. Interstate Printers and Publishers, Danville, Illinois, 19 .
3. Kramer, Jack. The Complete Book of Terrarium Gardening. Charles Scribner and Sons, New York City, New York, 1969.
4. Reiley, Edward H., and Shry Jr., Carroll L. Introductory Horticulture. Delmar Publishers Inc., Albany, New York.
5. Terrariums and Bottle Gardens, a 12 minute film available from the University of Illinois Film Center, 1325 South Oak Street, Champaign, Illinois 61820. In Illinois call toll free (1-800-252-1357).

INFORMATION SHEET 1

THE HISTORY OF TERRARIUMS

In 1836 Dr. Nathaniel Ward, an English surgeon used a glass bottle filled with soil to hatch a moth cocoon. Much to his surprise he discovered tiny ferns growing in the soil inside the bottle. Dr. Ward was very interested in his discovery because he had been unsuccessful when he tried to grow ferns in his home. At this time in history ferns were the most popular house plant in England.

Dr. Ward realized he had discovered something important as he watched his tiny ferns thriving inside the bottle. He published his findings and our first terrariums were known as Wardian Cases. Although notes from scientists in the early 1700's mention keeping plant specimens fresh in glass bottle, Ward is credited with the discovery. He also developed aquariums and vivariums.

Modern day terrariums are containers in which plants are grown. These containers are usually covered in order to maintain a rain cycle, however many open containers are also called terrariums. The word terrarium is derived from the Latin terra (earth) and ium (with).

INFORMATION SHEET 2

PLANTS FOR TERRARIUM

A. WOODLAND PLANT LIST

The woodland terrarium represents conditions similar to those found in the forest. These conditions include moist soil with a high organic content, shade, and cool temperatures.

Common Name	Scientific Name
Dwarf Maidenhair fern -	Adiantum hispidulum
Boxwood -	Buxus
English Ivy -	Hedera helix
Juniper -	Juniperus sp. 'var.'
Partridgeberry -	Mitchella repens
Table Fern -	Pteris cretica 'Parkeri'
Pitcher Plant -	Sarracenia purpurea
Club Moss -	Selaginella erythropus
Dwarf Yew -	Taxus media 'var.'
Woods Violet -	Viola orbiculata

B. TROPICAL PLANT LIST

Tropical terrarium plants prefer an environment that is warm, moist, and receives partial sun. A soil with a high organic content is also recommended.

Common Name	Scientific Name
Norfolk Island Pine -	Araucaria excelsa
Asparagus Fern -	Asparagus plumosus
Spider Plant -	Chlorophytum capense
Neanthe Bella Palm -	Collinia elegans
False Aralia -	Dizygotheca elegantissima
Creeping Fig -	Ficus pumila
Baby Tears -	Helxine soleiroli
Miniature Peperomia -	Peperoma 'var.'
Philodendron -	Philodendron 'var.'
Creeping Jenny -	Pilea depressa
Bird-nest Sansevieria -	Sansevieria 'var.'
Pothos -	Scindapsus aureus

C. DESERT PLANT LIST

Desert terrarium plants need dryer condition than woodland or tropical plants. The addition of sand to the growing medium will help maintain higher drainage.

Common Name	Scientific Name
Old Man Cactus -	CephaLocereus senilis
Peanut Cactus -	CephaLocereus silverstri
Pyramid Crassula -	Crassula lycopodiodes
Barrel Cactus -	Enchinocactus
Tiger Jaws -	Faucaria tigrina
Windowed Haworthia -	Haworthia cuspidata
Zebra Haworthia -	Haworthia fasciata
Kalanchoe -	Kalanchoe tomentosa
Stone Face -	Lithops
Bunny-ears -	Opuntia micordosys
Coral Beads Plant -	Sedum stahlii
Hen and Chicks -	Sempevivum

INFORMATION SHEET 3

PLANTING A LONG NECK BOTTLE

A. ADD SOIL, GRAVEL, AND CHARCOAL BY USING A FUNNEL.

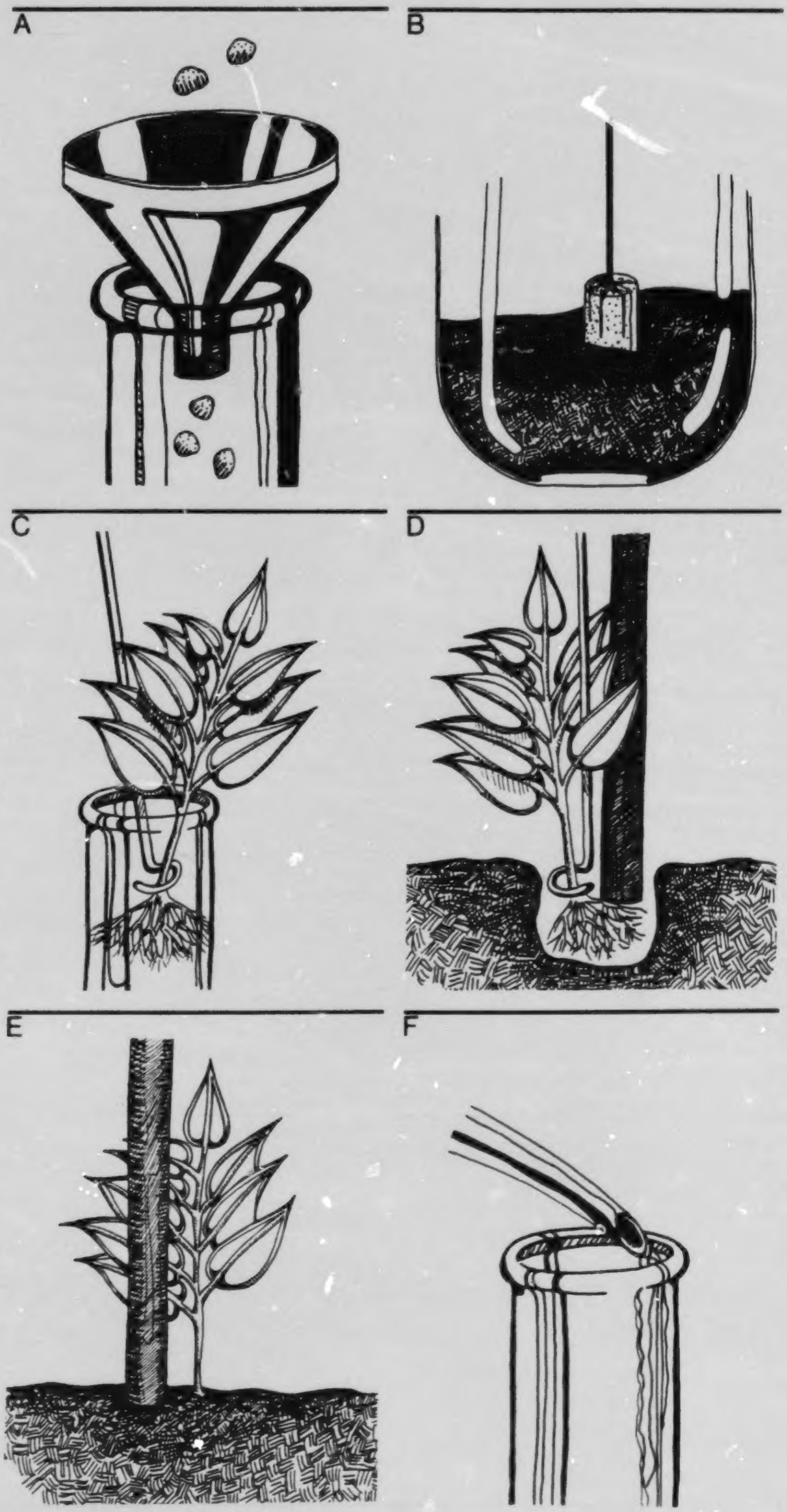
B. USE A TAMPING TOOL TO SHAPE SOIL.

C. USE A WIRE LOOP TOOL TO PLACE PLANTS IN THE CORRECT POSITION.

D. HOLD THE PLANT IN PLACE WITH A DOWEL ROD WHEN REMOVING THE WIRE LOOP.

E. ANCHOR PLANT BY FIRMING THE SOIL AROUND THE PLANT.

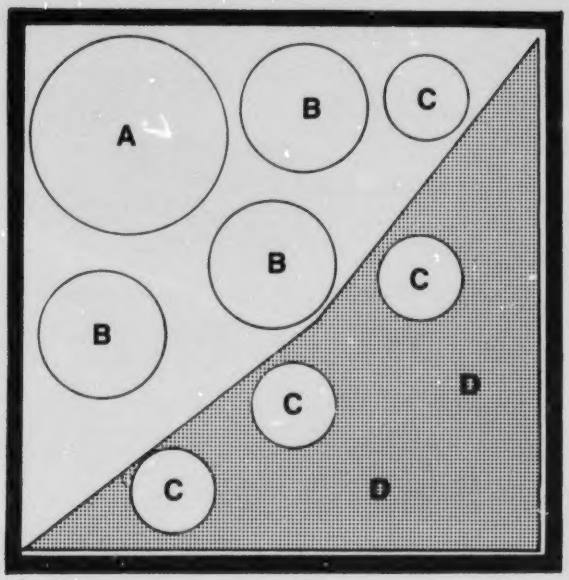
F. WATER CAREFULLY BY LETTING WATER FLOW AROUND THE INSIDE RIM OF THE BOTTLE.

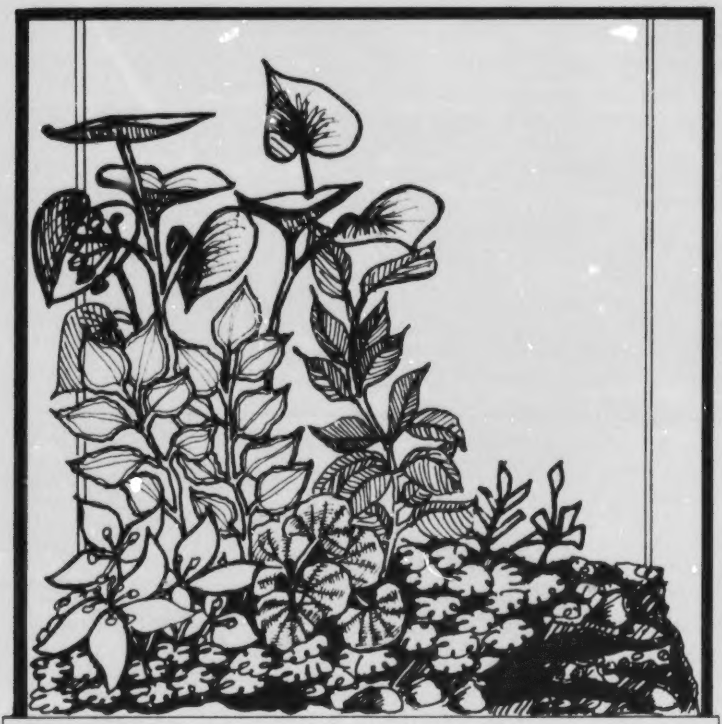


PLANTING PLAN FOR SQUARE

PLANT KEY

A. LARGE PLANT
B. MEDIUM PLANT
C. SMALL PLANT
D. GROUND COVER

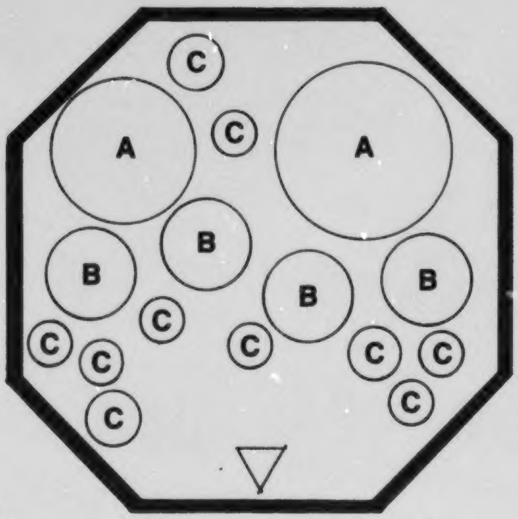




PLANTING PLAN: OCTAGONAL

PLANT KEY

A. LARGE PLANT
B. MEDIUM PLANT
C. SMALL PLANT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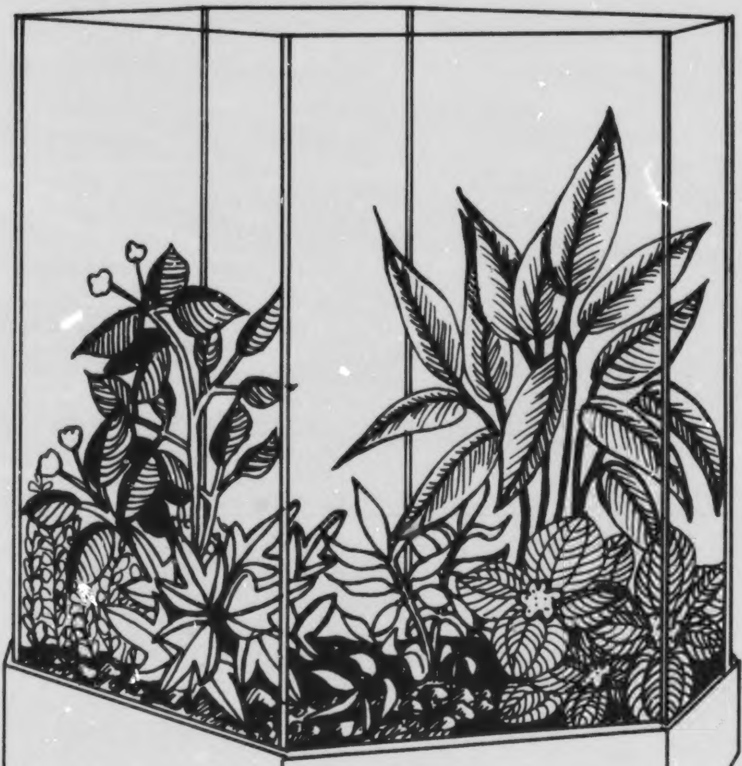

LABORATORY EXERCISE 1

REMOVING PLANTS FROM POTS

PURPOSE: The purpose of this laboratory exercies is to demonstrate the proper method of removing plants from pots for transplanting

MATERIALS:

1. Several potted plants
2. Table edge; garden stake or trowel handle used to tap the pot

PROCEDURES:

1. Place one hand on the soil surface to support the ball of soil. Spread your fingers around the plant stem.

2. Place the pot against the table edge and with the garden stake or trowel handle tap the top edge of the pot firmly but gently.

3. Allow the plant with the ball of soil to slip down out of the pot and remove the pot with the other hand.

4. Place the removed plant upright in your free hand and transplant the plant to the prepared hole in the terrarium or dishgarden. Do not allow roots to be exposed to the air for an extended period.

LABORATORY EXERCISE 2

MAKING TOOLS FOR TERRARIUMS

PURPOSE: The purpose of this laboratory exercise is to provide students with inexpensive, easy-to-make tools that they can use when making terrariums (tamper, wire, loop, long handle spoon and long handle fork)

MATERIALS:

1. empty spool of thread
2. 1 spoon
3. 1 fork
4. a wire coat hanger or #18 or #16 florist wire
5. 3 dowel rods (¼")
6. Transparency 3-Tools for Terrariums and Dish-gardens
7. glue
8. pliers
9. wire cutters
10. 24 wt. wire

PROCEDURES:

Tamper

1. Add a few drops of glue to the end and sides of one dowel rod.

2. Insert the glued end into an empty spool of thread.

Long Handle Spoon

1. Attach the end of the spoon to the end of one dowel rod by wrapping them together with #24 wt. florist wire (see Transparency 3).

Long Handle Fork

1. Repeat the procedure above using a fork instead of a spoon.

Wire Loop

1. Cut the top of a coat hanger open with wire cutters to remove the hook and twisted wire.

   #18 or #16 florist wire may be used if available

2. Straighten out wire.

3. Using pliers, curl a small loop at one end of the wire (see Transparency 3).

LABORATORY EXERCISE 3

PREPARING A TERRARIUM SHOWCASE FOR SMALL PLANTS

PURPOSE: The purpose of this laboratory exercise is to outline a procedure for preparing and maintaining a terrarium for miniature plants.

MATERIALS:

1. terrarium container (a large glass bowl or jar)
2. glass cover for the terrarium
3. charcoal
4. moss
5. growing media
6. gravel
7. number of plants suitable for terrarium growth. Examples include: Baby's Tears, Begonias (everblooming), Fittonia, Ivy (miniature types), Maranta, Palms (small), Pteris (table ferns), Peperomia, Saintpaulia (African Violet), evergreen seedlings, dogtooth violet, Dutchman's breeches, hepatica, varieties of mosses, mushrooms.
8. tools
9. decorative materials: bark, pebbles, small animals

PROCEDURES:

1. Select an attractive container for the terrarium. A large jar or bowl is satisfactory. Wash the container thoroughly and polish it so it will sparkle.

2. Determine where the terrarium will be displayed. If it is to be viewed from one side, place larger plants in the background and smaller plants toward the front.

3. Line the container with moss, green side out, to the height the container will be filled with soil. This will give the bottom and sides of the container an attractive appearance.

4. Place 1/2 to 1 inch of charcoal in the bottom of the container. On top of the charcoal, place 1 inch of gravel.

5. On top of the gravel place 1 or 2 inches of soil. A good medium is a soil mixture of two parts loam, two parts coarse sand, and one part leaf mold. This mixture is not so rich that the plants will rapidly outgrow their rather limited space.

6. Arrange the soil into small hills and valleys. Place each plant in the terrariums so it will present a desired contrast of shape and color with surrounding plants. Make sure each plant is placed no deeper than they are growing. Place variegated foliage next to solid, and colorful plants next to green plants. An effective ar-

rangement is to have a plant of major interest near the front and center of the terrarium.

7. Add decorative material such as pebbles, bark, large rocks, and clay animals.

8. Clean the excess soil from the container after adding plants and decorative material.

9. As the plants grow too large and distort the appearance of the small environment, replace them with cuttings or plants of appropriate size. Keeping the small scale proportion and effect is much of the charm of the terrarium.

10. Place the terrarium in good light, but not in direct sunlight, as this would overheat and kill the plants.

11. Place a glass cover partially over the terrarium to control humidity and watering. If moisture condenses on the cover, remove it for a time.

12. Maintain the terrarium in an attractive place.

LABORATORY EXERCISE 4

PREPARING A DESERT DISHGARDEN

PURPOSE: The purpose of this laboratory exercise is to outline the procedure for preparing and maintaining a desert dishgarden.

MATERIALS:

1. dishgarden container
2. growing media (1 part loam, 1 part peat, 2 parts sand)
3. tools: trowel, spoon
4. plant material: cacti or other succulents that have a variety of shape, color and texture

PROCEDURES:

1. Mix the growing media, and add moisture if necessary.

2. Fill the container 1/2 to 3/4 full with soil.

3. Select several cacti or succulents and arrange them so they will present a desired contrast of shape, color and texture.

4. Take care to plant the cacti at the same level they have been growing.

5. Add soil so that 1/2 inch is left between soil level and rim of the container.

6. Add decorative materials.

7. Clean excess soil from container and plants.

LABORATORY EXERCISE 5

IDENTIFYING TERRARIUM PROBLEMS

PURPOSE: The purpose of this laboratory exercise is to inspect various terrariums and dish gardens and identify specific problems.

MATERIALS:

1. Several sample terrariums and dishgardens that contain the following problems:

   a. incompatable plants (highlight + low light levels)
   b. overgrown plants
   c. insect problems
   d. incorrect planting media
   e. poor choice of container
   f. over watered conditions
   g. poor design
   h. dirty terrarium glass

PROCEDURES:

1. Place several dishgardens and terrariums at different stations around the lab room. (labled A-H)

2. Ask the students to visit each station and identify anything that would interfere with proper plant growth.

3. Each station may contain one or more problems.

OBSERVATIONS:

Have the student fill in the following observation check sheet. Place the letter of the corresponding problem(s) in the space provided.

Station 1 __________
Station 2 __________
Station 3 __________
Station 4 __________
Station 5 __________
Station 6 __________
Station 7 __________
Station 8 __________

Problem List

a. incompatible plant combination
b. overgrown plants
c. insect and/or disease problems
d. incorrect planting media
e. poor choice of container
f. overwatered conditions
g. poor design
h. dirty terrarium glass
i. nothing is wrong
j. incorrect light exposure

For each station, explain how you would correct the problem.

Station 1. ______________________________

____

____

Station 2. ______________________________

____

____

Station 3. ______________________________

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Station 4. ______________________________

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Station 5. ______________________________

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Station 6. ______________________________

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Station 7. ______________________________

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Station 8. ______________________________

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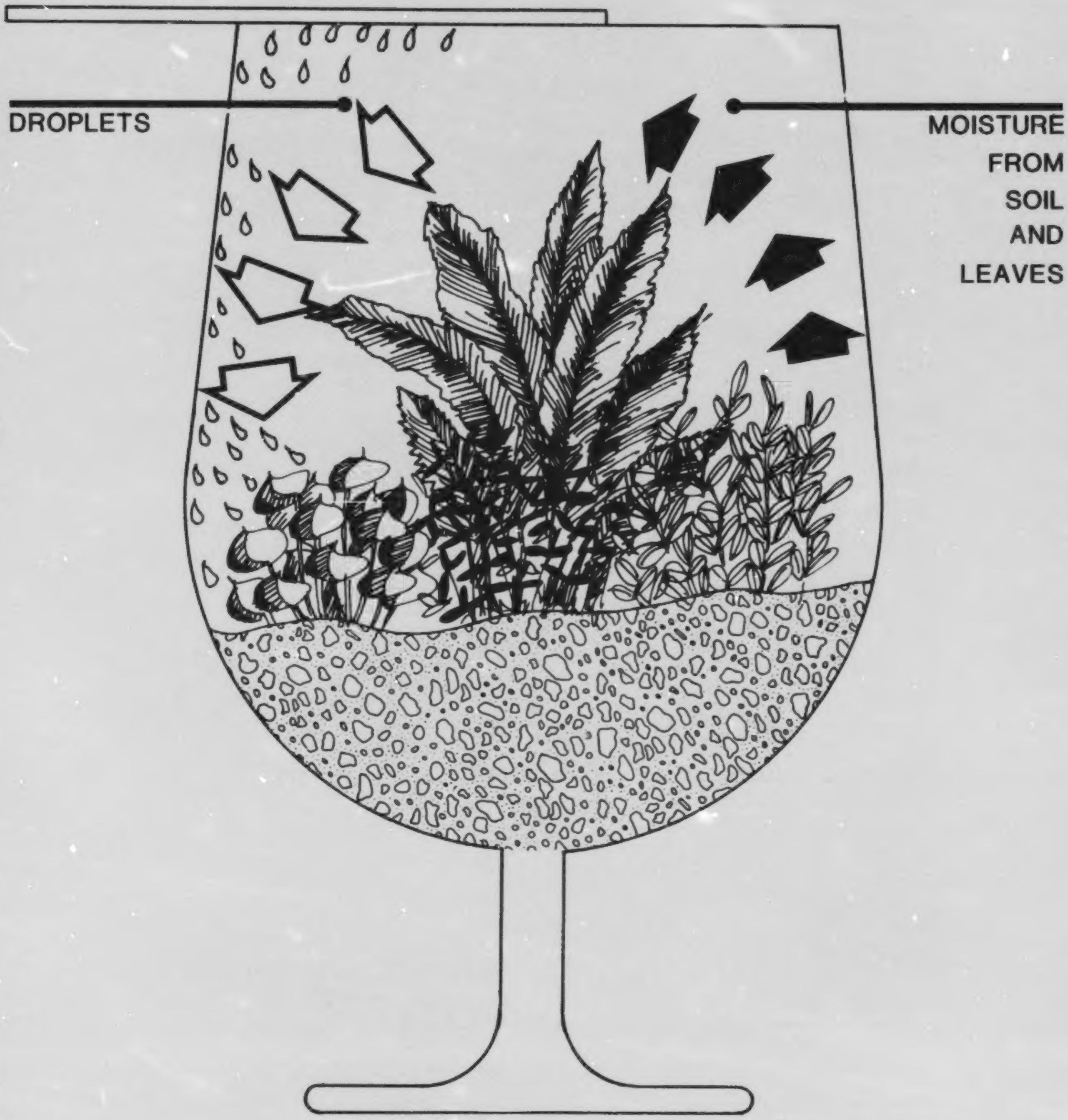
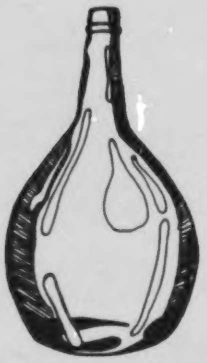
____

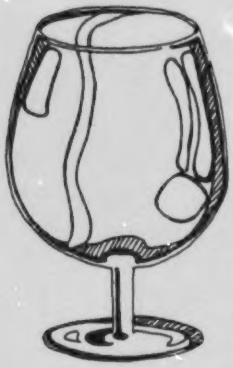
TERRARIUMS MAINTAIN ENVIRONMENT


DROPLETS
MOISTURE FROM SOIL AND LEAVES

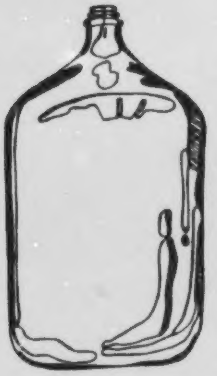
TERRARIUM CONTAINERS



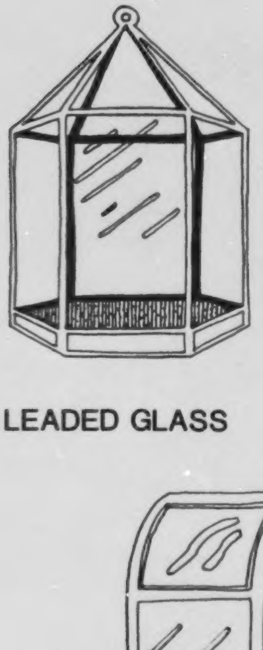
SLENDER GLASS BOTTLE



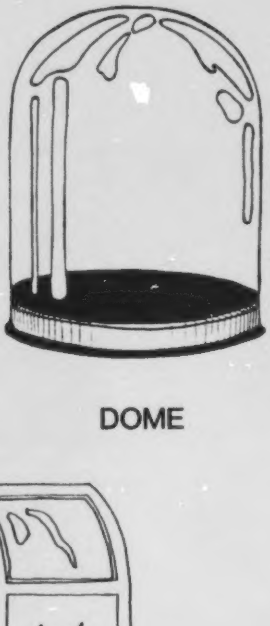
BRANDY SNIFTER



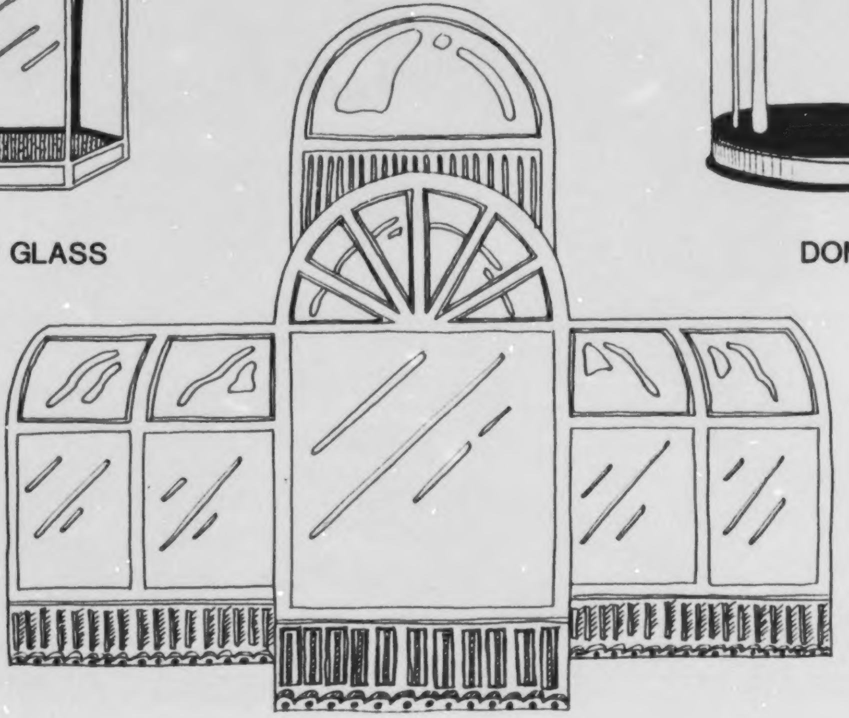
FIVE GALLON
WATER BOTTLE



LEADED GLASS

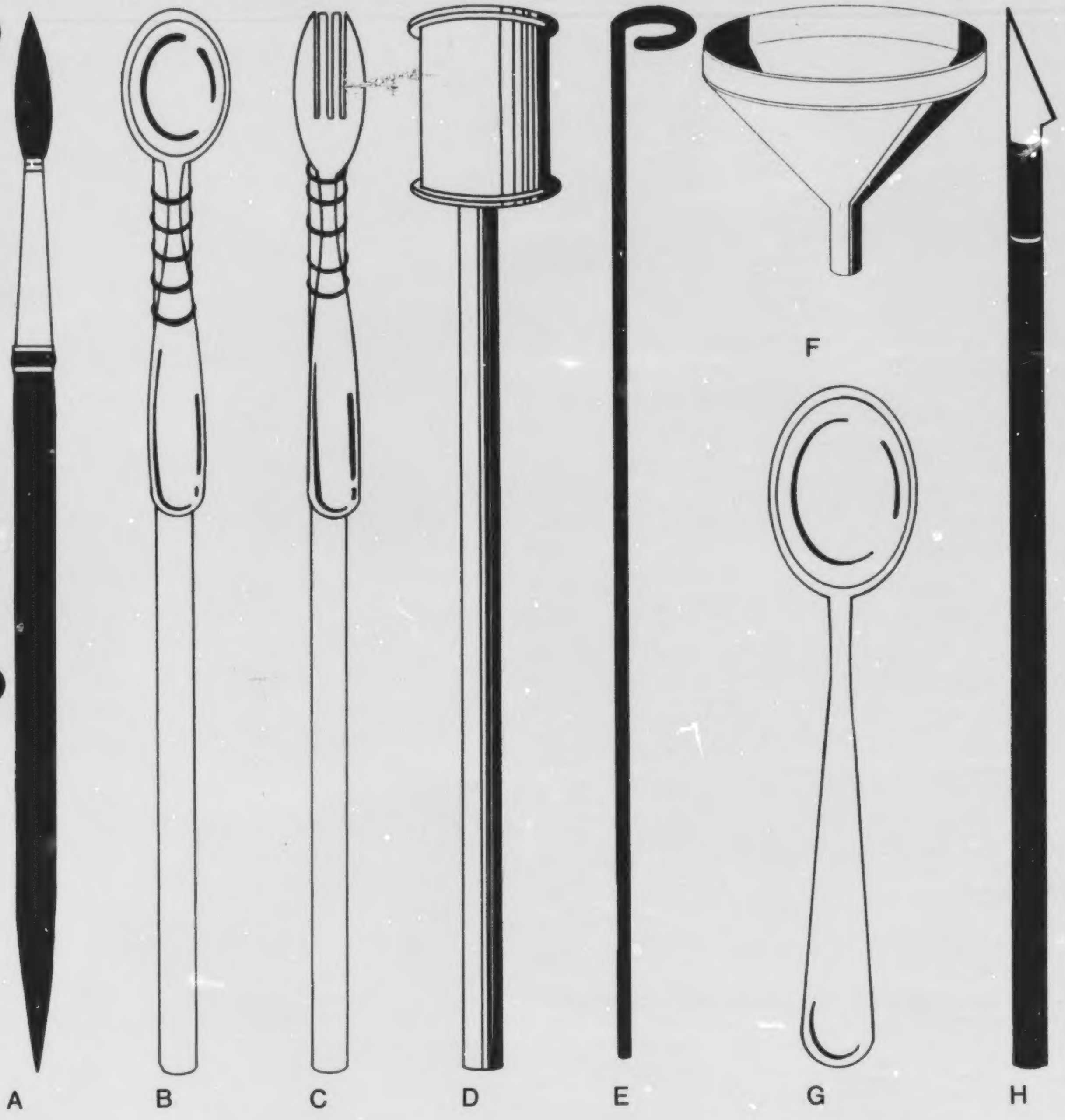


DOME



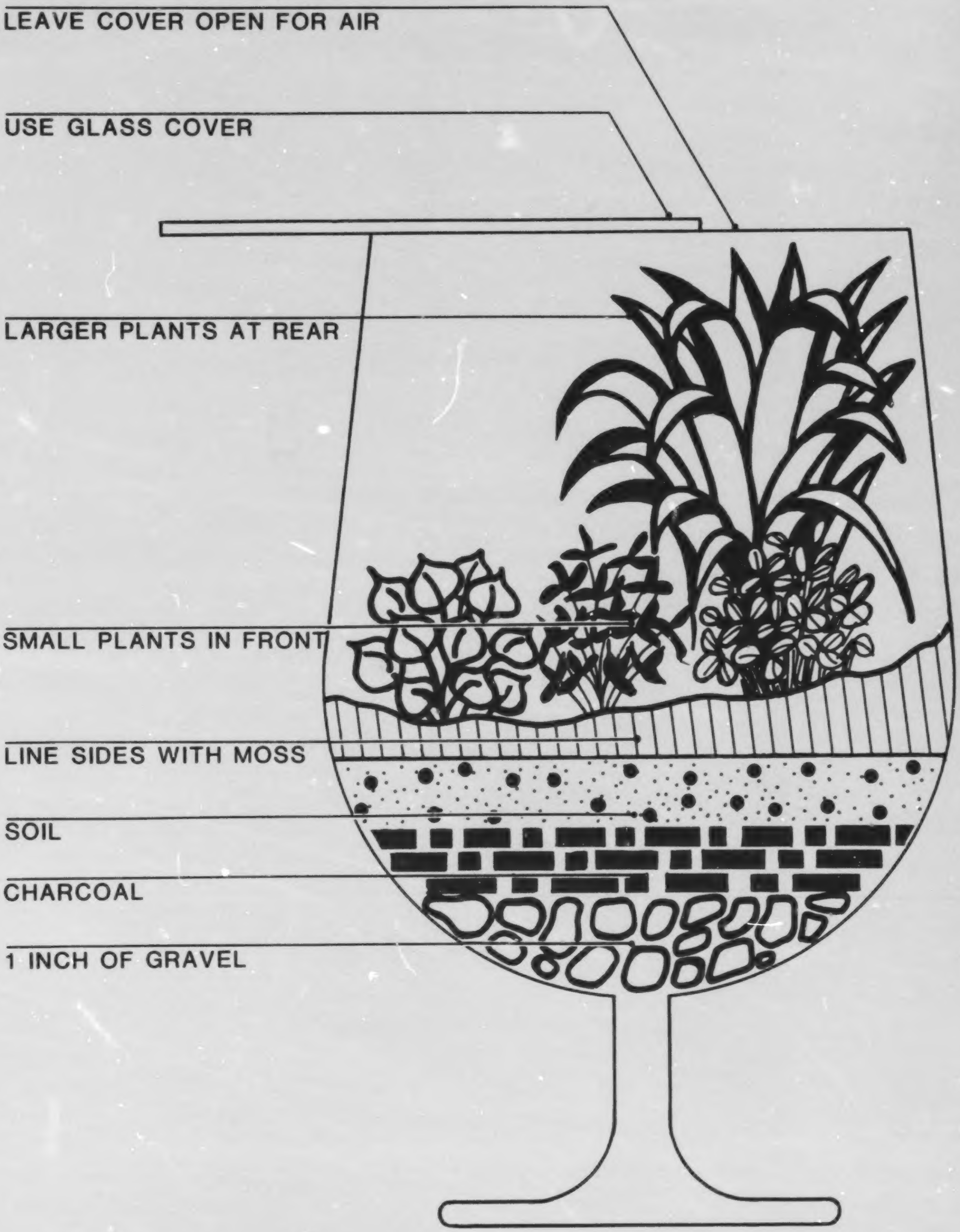
WARDIAN CASE FROM VICTORIAN ERA

TOOLS FOR TERRARIUMS AND DISHGARDENS



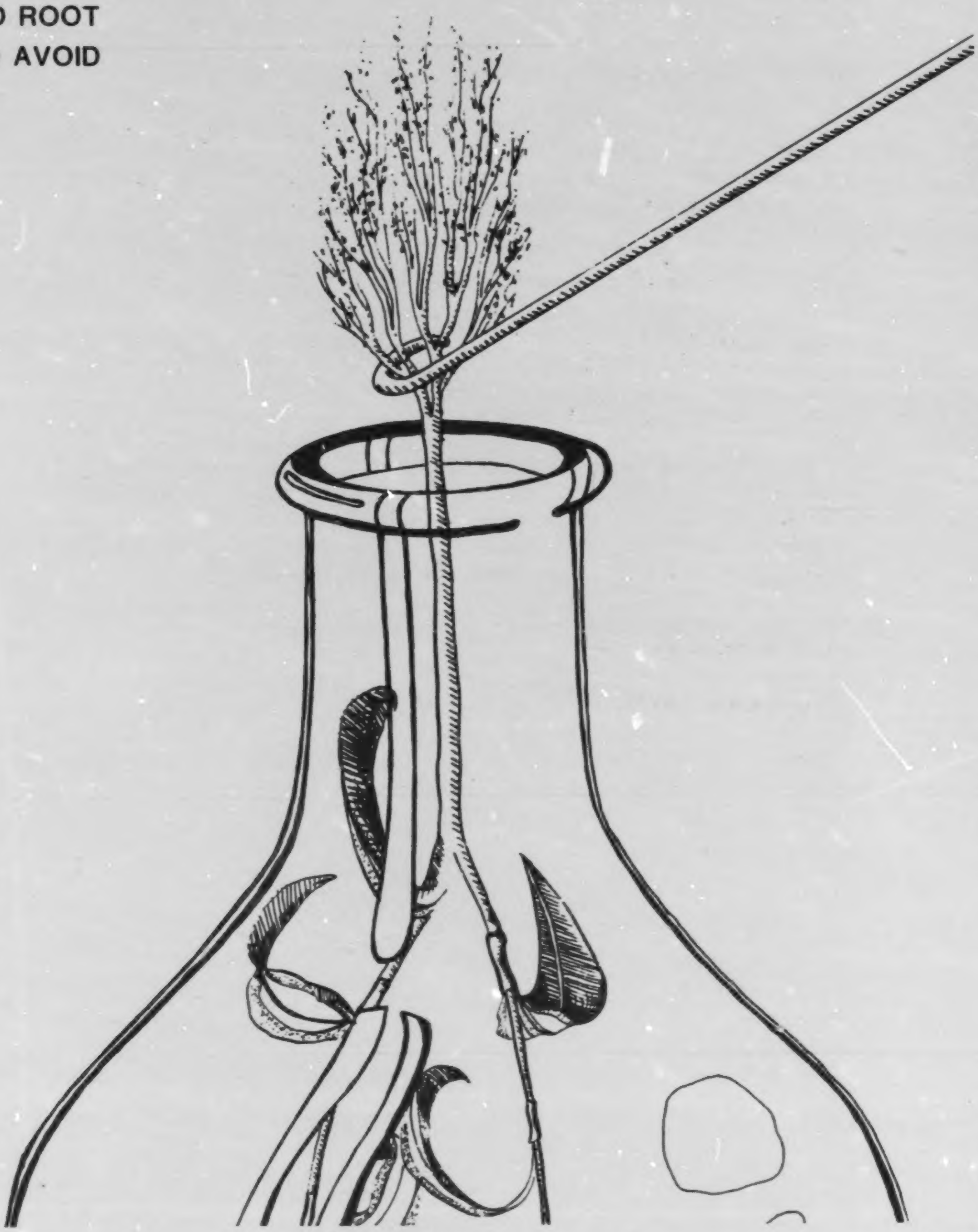
A. BRUSH
B. SPOON ATTACHED TO DOWEL
C. FORK ATTACHED TO DOWEL
D. TAMPER (EMPTY SPOOL)
E. WIRE LOOP (HANGER)
F. FUNNEL
G. SPOON
H. KNIFE

CROSS-SECTION OF A TERRARIUM


LEAVE COVER OPEN FOR AIR
USE GLASS COVER
LARGER PLANTS AT REAR
SMALL PLANTS IN FRONT
LINE SIDES WITH MOSS
SOIL
CHARCOAL
1 INCH OF GRAVEL

REMOVING A PLANT FROM AN OVERGROWN TERRARIUM

PLANTS SHOULD BE REMOVED ROOT FIRST TO AVOID DAMAGE.



TRANSPARENCY DISCUSSION GUIDE

DESIGNING DISHGARDENS AND TERRARIUMS

I. Transparency--TERRARIUMS MAINTAIN THEIR ENVIRONMENT

Terrariums provide an excellent example of recycling. Water absorbed through the roots moves up into the leaves and is given off in the form of vapor during photosynthesis. This vapor collects on the glass and runs back into the soil. This is also known as a rain cycle.

II. Transparency--TERRARIUM CONTAINERS

There are several things to consider when selecting a container

a. Color of the glass - enough light must be able to pass through so photosynthesis can occur

b. Size of container opening - this factor can limit the type of plants used in the terrarium

c. Style of the container - the shape and size of the container should blend with the decor of the room

III. Transparency--TOOLS FOR THE TERRARIUM

Various tools may be necessary to plant a terrarium, depending upon its size and shape. Some tools can be easily made from household materials.

IV. Transparency--CROSS SECTION OF A TERRARIUM

Note the various layers of charcoal gravel and soil of a properly planted terrarium.

V. Transparency--REMOVING A PLANT

A special tool may be necessary to remove a plant from a terrarium with a small opening. The plant should be removed upside down to avoid damage to roots and leaves.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

DESIGNING DISH GARDENS AND TERRARIUMS

TRUE or FALSE:

False 1. Any colored glass container may be used for a terrarium.

True 2. Charcoal is used in terrariums to remove musty odors.

True 3. The first terrariums were known as Wardian Cases.

False 4. Terrarium plants remain insect and disease free.

False 5. Dishgardens may need their covers removed occasionally to release excess moisture.

False 6. When transplanting a plant into a terrarium, it is important to remove all the soil from the root system.

True 7. Special tools may be necessary to plant some terrariums.

False 8. The soil level in a dishgarden should reach the top of the container.

False 9. Charcoal is used in a terrarium and dishgarden for drainage.

True 10. Enough light must pass through a terrarium so that photosynthesis can occur.

MULTIPLE CHOICE:

1. The word terrarium is derived from the Latin terra and ium which means:

   a. earth/covered
   *b. earth/with
   c. container/earth
   d. none of the above

2. Boxwood, clubmoss, juniper, and English ivy are plants that are suitable for a:

   *a. woodland garden
   b. desert garden
   c. tropical garden
   d. all of the above

3. Old man cactus, tiger jaws and kalanchoe are plants that are suitable for a:

   a. woodland garden
   *b. desert garden
   c. dish garden
   d. b & c

4. Hens and chicks, maiden hair fern and pothos are plants that are suitable for a:

   a. woodland garden
   b. desert garden
   c. tropical garden
   *d. none of the above

5. Dry conditions, 1/4 sand in the growing media, and bright indirect light are conditions describing a:

   a. woodland terrarium
   *b. desert terrarium
   c. tropical terrarium
   d. b & c

6. When selecting a terrarium container you should consider:

   a. color of glass
   b. size of container opening
   c. style and shape of container
   *d. all of the above

7. ___________ make(s) an excellent drainage material in terrariums and dishgardens.

   a. sheetmoss
   *b. pebbles
   c. charcoal
   d. woodchips

8. When plants outgrow a terrarium or dishgarden they should be:

   a. discarded
   b. pruned
   c. transplanted to another container
   *d. b & c

9. A common problem that causes poor growth in terrariums and dishgardens is:

   a. a rain cycle
   b. sheetmoss
   *c. over watering
   d. photosynthesis

10. Terrariums are used for:

   a. gifts
   b. decoration
   c. hard to grow plants
   *d. all of the above

ESSAY:

1. Describe the procedure for planting a

   a. terrarium - Select an attractive container and several compatible plants. Line the container with moss, add ½ inch layer of charcoal and ½ inch layer of gravel. On top of the gravel add 2 inches of soil. Arrange the plants, add decorative material and clean excess soil from the container.

   b. dishgarden - Select a container and several compatible plants. Fill the container 1/2 to 3/4 full with soil. Arrange the plants and add additional soil if necessary. Add decorative material and clean excess soil from the container and plants.

2. Why isn't it necessary to water a terrarium as often as a dishgarden? Most terrariums have a covered top or a very small opening. This reduces the amount of evaporation from the soil. A covered terrarium will recycle moisture. Water that evaporates from the soil condenses on the glass and runs back down into the soil. Dish gardens are uncovered, so any water that evaporates is lost to the atmosphere.

UNIT M: RETAIL FLORICULTURE

PROBLEM AREA: OPERATING A RETAIL FLOWER SHOP

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended times for teaching this problem area are prior to plant sales conducted by the class, or prior to visiting a flower shop or other horticultural businesses.

The estimated instructional time for this problem area is 5 to 7 days depending on how far the teacher wishes to go in discussing and developing business operation skills. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

Although this problem area deals only with the operation of a retail flower shop, much of the information can be adapted to other horticultural businesses (i.e., garden centers, nurseries, or greenhouses). Instructors are encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets student worksheet, laboratory exercises, transparency discussion guide, and test questions were developed by Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois and reviewed by Paul E. Hemp, Janet L. Henderson, and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Retail floriculture

II. Problem area: Operating a retail flower shop

III. Objectives: At the close of this problem area the students will be able to:

1. Describe six different types of flower shops.
2. Discuss factors to consider when selecting a location for a flower shop.
3. Plan for the interior and exterior layout of a flower shop.
4. Identify financial records necessary for profitable operation of a flower shop.
5. Describe the basic principles of personnel management.
6. Design procedures for working with wire order services.

IV. Suggested interest approaches:

1. Ask each student to select a location in town where they would like to establish a flower shop. Discuss factors influencing their decisions.
2. Find out how many students have jobs, and discuss the procedures they followed to obtain them.
3. Ask the students how much money they have earned and/or spent in the last two weeks. Relate this to the importance of record keeping.
4. Ask the students what procedures they would follow in order to send flowers to a person in another city or state.
5. Ask the students about their experiences with sales personnel in various stores, and discuss positive and negative qualities.

V. Anticipated problems and concerns of students:

1. What are the different types of flower shops?
2. What type of services do flower shops provide?
3. What factors should I consider when planning a location for a flower shop?
4. Where can I locate information about the community and potential flower shop locations?

5. What areas should I consider when planning the layout of a flower shop?

6. How does the layout and design of a shop affect customers and employees?

7. Why should I keep business financial records?

8. What types of business financial records should I keep?

9. How many employees are needed in a flower shop?

10. How do I select an employee?

11. How do I train an employee?

12. What are the qualities of a good employee?

13. What is a wire order service?

14. What information do I need in order to send a wire order?

15. What information do I need when receiving a wire order?

VI. Suggested learning activities and experiences:

1. Have students visit several flower shops in the community and classify them according to the characteristics listed in Information Sheet 1-Types of Flower Shops.

2. Invite a member of the Chamber of Commerce to the class and discuss the income level, value of homes, zoning ordinances, and other factors affecting the establishment of a business in the community.

3. Have each student select a horticultural- or agricultural-related business in the community and analyze the location, using Student Worksheet 1-Types of Flower Shops.

4. Have the class visit a local flower shop or other horticultural business and diagram the interior and exterior layout of the shop.

5. Invite a local flower shop owner to the class to discuss the type of shop he or she owns.

6. Discuss several types of financial records necessary for profitable operation of a flower shop using Information Sheet 4 and the transparencies included in this problem area.

7. Conduct a plant sale and have students maintain financial records including: petty cash slips, a daily summary, and inventory check list.

8. Have a local florist visit the class and discuss procedures used to hire and train an employee.

9. Have each student fill out an application for employment using Student Worksheet 2.

10. Invite a local wire service representative to the class, and discuss membership requirements and the proper procedures for sending and receiving an order.

11. Have the class develop a training manual for a new employee. Items covered can include taking an order, the shop's delivery policy, plant and cut flower care, and sending and receiving wire orders.

12. Using a wire order design book, and a membership listing, have each student take an order from another member of the class and "send it" to a third member of the class using Laboratory Exercise 1 and Information Sheet 6.

13. Have the students critique the layout of the flower shop in Student Worksheet 3, and list suggestions to improve the design.

VII. Application procedures:

1. Skills learned in operating a retail floriculture business will aid students seeking employment in the horticulture industry.

2. Skills learned in operating a retail floriculture business will aid students planning to open their own horticultural business.

VIII. Evaluation:

1. Evaluate worksheets and projects completed by each student.

2. Prepare and administer a written exam using the sample test questions in this problem area.

IX. References and aids:

1. Krone, Paul R. Starting and Managing A Retail Flower Shop, Small Business Administration, Washington, D.C., 1970.

2. Cavin, Bram. How to Run a Successful Florist and Plant Store, David McKay Company, Inc., New York, 1977.

3. Taetzsch, Lyn. Opening Your Own Retail Store, Contemporary Books, Inc., Chicago, Illinois, 1977.

4. Gerding, Mildren F. Retail Floristry: Sales and Merchandising, Instructional Materials Center, The University of Texas at Austin, 1976.

5. Pfahl, Peter B. Retail Florist Business, 4th ed., Interstate Printers and Publishers, Inc., Danville, Illinois, 1983.

INFORMATION SHEET 1

TYPES OF RETAIL FLORISTS

I. Grower-Retailer Shop

* Grower-Retailer florists make up slightly less than half the retail florist outlets.

* Sizes may range from shops with one greenhouse to shops with several greenhouses.

* This category may include shops that contain garden centers and nurseries.

* Few grower-retailers raise everything they sell, because it is not cost-effective.

* Ability to raise hard-to-get flowers.

* Extra storage space is usually available.

* Allows the florist to advertise for fresh-grown products.

* Lack of walk-in traffic.

* Need to build a regular clientele due to lack of walk-in traffic.

* Longer hours necessary to maintain greenhouse and/or nursery.

II. Neighborhood Shop

* The typical neighborhood shop is small to medium in size.

* Offers moderately-priced products.

* Usually has a large phone clientele.

* Is usually family owned and operated.

* Offers a variety of services (e.g., weddings, funerals, deliveries, or wire service).

* Has moderate-priced rents compared to downtown or mall locations.

* Usually adequate space for storage.

* Availability of walk-in traffic.

III. Shopping-Mall Florist Shop

- Most of the trade is walk-in and cash-and-carry.
- Wedding and funeral sales are lower compared to other types of shops.
- Gift sales are higher.
- Rents are very high.
- Shops usually must abide by mall rules (e.g., store hours).
- Special fees are assessed for cooperative promotions.
- Space is usually limited in both sales room and designing area.
- Shopping mall outlets stimulate impulse sales.

IV. Hospital Shop

- The hospital shop is usually small and limited in space.
- This type of shop is often a branch of a neighborhood shop.
- Gift novelties, small vase arrangements, gifts for new mothers, potted and flowering plants are often featured.
- This shop may be run by hospital personnel and a percentage of sales may be donated to the hospital.
- Few loose flowers are sold.
- Arrangements are usually made in the parent shop and then brought to the hospital shop on a daily basis.

V. The Hotel Shop

- The hotel shop caters mainly to conventions, banquets, and parties held on the premises.
- Customers are often in a hurry and the florist must be able to make arrangements quickly.
- Rent is high and space is limited.
- Items are usually expensive and selection is often limited.
- The hotel shop has few regular customers.
- The hours are usually much later than other types of flower shops.

VI. Grocery Store Flower Shop

- This type of shop is generally owned and operated by the grocery store company.
- Caters to the impulse buyer.
- Mixed bunches of cut flowers and flowering or green plants are the most popular items.
- Services are limited, and do not include weddings, funerals, deliveries, or wire services.
- Provides for one-stop shopping.

INFORMATION SHEET 2

SELECTING THE SHOP LOCATION

Location has a major effect on the success or failure of a flower shop. The type of shop you operate also will be determined by the location. The following questions highlight items to consider when selecting a location for a flower shop.

A. Customer Profile

1. Who are your customers?
2. How old are they?
3. What is their average income?

B. Community Profile

1. Do several industries support the community?
2. Are the homes well kept?
3. Are you located near a hospital or mortuary?

C. Competition Profile

1. How many flower shops are in the area?
2. No flower shops? Find out why!
3. Check non-competitive shops (fine wines and cheese shops); this indicates that the community can afford flowers and plants.

D. Site Profile

1. Are there parking facilities?
2. How fast does traffic pass the area?
3. Which side of the street is the location on? South and west exposures are best.
4. Is there a steady flow of traffic in the area?
5. What is the walk-in trade potential?
6. Are your suppliers nearby? Wholesale florists, etc.?
7. Check the history of the site. Have other businesses been unsuccessful in the same spot?
8. Check zoning ordinances.
9. Flooding problems?

INFORMATION SHEET 3

SHOP LAYOUT

The shop layout includes 5 main areas: the storefront, the workroom, the display or sales area, the office, and the delivery area. When planning the shop layout you should be concerned with your customers as well as your working conditions. An effective shop layout is an additional "selling tool" that can be utilized by you and your employees.

I. The Store Front

The store front serves 4 main functions; identification of your business, display of merchandise, inviting entrance to sales area, and to highlight the interior.

A. Identification - the storefront should clearly indicate that the shop is a flower shop. Signs should be clear, simple and contain a logo that can be used on your delivery truck and wrapping paper.

B. Display - your storefront should have an eyecatching display in the window. Good lighting and frostfree glass are essential components.

C. Entrance - the door should be easy to open and easily accessible for handicapped people. Avoid steps if possible.

D. Setting off the interior - the storefront should act as a frame for a picture, and attract attention to the inside of the store.

II. The Sales or Display room

The sales room should be flexible and display merchandise to its advantage. It also should allow the customer to be comfortable when walking around displays. The type of display used in your store will project the image you wish to present.

A. Flexibility - displays should be flexible so they can be changed regularly, especially at holiday time.

B. Easy access - customers should be able to view the merchandise easily. Refrigerators should be properly lighted and labeled whether they are self-serve or if assistance is required. All displays should encourage browsing.

C. Spots or vignettes - these are displays in which special items are displayed. They are usually highlighted with spotlights and signs.

III. The Workroom

A well-planned workroom will promote efficiency of the employees. Some shops prefer an open workroom that is visible to the customers, but others find this distracting.

A. Layout of workroom - this should be carefully planned to minimize lost time and motion. A flow chart showing patterns of movement will also promote efficiency. Access to supplies should be kept in mind when locating work tables. Electrical outlets and sinks also should be located near tables.

B. Floors - floors should be made of an easy to clean material. Rubber mats should be provided for employees that stand at a work table all day.

C. Lighting - the design area should be well-lighted. 200 foot candles is recommended. Lights should not be placed where they will cast shadows on the designers' table or be in the designers' eyes. (A foot candle equals the illumination falling on a surface 12 inches by 12 inches in size from a candle one foot away.)

IV. The Office

The office should be located with a good view of the work room. Business machines and files are located in this area.

V. Delivery Area

It is desirable to have a separate delivery area with access to the outside that will not interfere with the sales room. Space should also be allowed for incoming merchandise and outgoing orders. Many shops use an attached garage as a delivery area.

INFORMATION SHEET 4

FINANCIAL RECORDS

Petty Cash

A petty cash fund is used for small miscellaneous purchases that come up during the day. Petty cash funds range from $10.00-15.00 depending on the store's needs. When money is removed from this fund a petty cash slip should be filled out. The receipt for the purchase is often attached to the slip.

Amount ____________ No. ________

RECEIVED OF PETTY CASH

________________ 19__

For ______________________________________

Charge to ________________________________

____

Approved by ______________________ Received by __________________

Daily Summary

At the end of each day the money in the cash register needs to be counted and checked against the register receipts.

First find the total on the cash register tape. Adjust any overrings or voids. Add or subtract any miscellaneous receipts, and calculate a total for cash receipts.

The next step is to count the cash in the register or cash on hand. This includes coins, bills, checks and charge cards. Subtract the change fund and compare the total of cash receipts to cash on hand. They should be the same. The difference if any is an overage or a shortage. An overage can be caused by not giving a customer enough change, or forgetting to ring up a sale. Shortages are often caused by giving a customer too much change or an unauthorized removal of cash from the register.

DAILY SUMMARY

Cash Receipts

1.	Cash Sales	$435.00
2.	Miscellaneous Receipts	15.00
3.	Total Receipts to be Accounted For	450.00

Cash On Hand

4.	Cash in Register:		
	Coins	25.00	
	Bills	374.00	
	Checks	95.00	
	Total Cash in Register		494.00
5.	Less: Change Fund		50.00
6.	Total Cash to be Deposited		444.00
7.	Total Receipts to be Accounted For		450.00
8.	Cash Short (item 7 greater than item 6)		6.00
9.	Cash Over (item 7 less than item 6)		-

Total Sales

10.	Cash Sales	$435.00

Sales Tax

Stores are responsible for collecting and recording sales tax. A form will be mailed monthly to your store from the State Department of Taxation and Finance.

Balance Sheet

A balance sheet compares the assets of a business (anything owned by the store that has a monetary value) and liabilities (anything that the business owes). The assets less the liabilities equals the owner's equity (or capitol - what really belongs to the owner). Samples of assets and liabilities are listed on the sample balance sheet below.

BALANCE SHEET: As of 12/31/8_

ASSETS		LIABILITIES	
Cash	5,000	Accounts Payable	4,000
Inventory	25,000	Notes Payable	6,400
Supplies	500	Taxes Payable	500
Furniture & Fixtures	2,000		10,900
Prepaid Insurance	300		
		Owner's Equity	21,900
	$32,800		
		Total Liabilities & Owner's Equity	$32,800

Income Statements

Income statements are filled out at the end of each month. This shows whether the business is operating at a profit or a loss.

INCOME STATEMENT

Month of __________, 19__ and ___ months ended __________, 19__

		This Month		Year to Date	
		Amount	Percent of Sales	Amount	Percent of Sales
+	Net Sales	$______	100	$______	100
	Less Cost of Goods Sold:				
+	Beginning Inventory	______		______	
+	Merchandise Purchases	______		______	
+	Merchandise Available for Sale	______		______	
+	Less Ending Inventory	______		______	
+	Cost of Goods Sold	______	______	______	______
+	Gross Margin	______	______	______	______
	Less Expenses:				
-	Salaries and Wages	______		______	
-	Rent	______		______	
-	Utilities	______		______	
-	Repairs and Maintenance . . .	______		______	
-	Delivery Expense	______		______	
-	Supplies	______		______	
-	Promotion	______		______	
-	Depreciation	______		______	
-	Bad Debts	______		______	
-	Taxes	______		______	
-	Insurance	______		______	
-	Interest	______		______	
-	Other Expense	______		______	
	Total Expenses	______	______	______	______
	Operating Profit (Loss) . . .	______	______	______	______

Other forms filled out by florists include payroll, wire order records* and income tax records.

*See Information Sheet 6.

INFORMATION SHEET 5

PERSONNEL MANAGEMENT

I. How much help is needed in a flower shop?

A. The average shop needs one person for every $15,000-$18,000 of annual gross sales.

II. Where can you find help?

A. Contact high school or community college vocational horticulture programs.

B. Contact professional floral design schools.

C. Advertise in the local newspaper.

D. Enlist help of family members.

III. How do you select an employee?

A. Have the potential employee fill out an application for employment.

B. Conduct a personal interview.

C. Check references of former employers.

D. Have the potential employee demonstrate design skills.

IV. How do you train an employee?

A. Have the employee become familiar with the price and names of merchandise.

B. Demonstrate the proper care and handling of plants and flowers for the employee.

C. Train the employee on the proper method of taking and filling an order.

D. Point out the qualities of a good employee, which are:

1. agreeable personality
2. thorough knowledge of merchandise
3. able to make suggestions to customers
4. a good listener
5. avoids arguments with customers

6. uses proper English
7. is honest and enthusiastic
8. is courteous and friendly
9. can follow instructions of employer

Sample letter used to check on applicant's previous work record

---

THE FRESH FLOWER SHOP
176 W. Main Street
Anytown, Illinois 61820
(217) 333-1000

March 3, 1984

Mr. Mark Marvel
Frobish Flower Shop
100 State Street
This Town, Illinois

Dear Mr. Marvel:

Rhoda Dendron has given your name as a reference on her job application with our company. We would appreciate your answering the following questions enclosed in this letter. Please return this form in the stamped, self-addressed envelope provided in this letter.

Thank you.

Sincerely,

The Fresh Flower Shop

William Waterman, Owner

---

1. Dates of employment from ____________ to ______________
2. Job title ____
3. Responsibilities ____
4. Quality of work ____
5. Absenteeism (circle one) excessive average low

INFORMATION SHEET 6

FLOWERS BY WIRE

The service of sending flowers to any city or country in the world, was formed during a meeting of the Society of American Florists in 1910. The four major organizations that perform this service are:

1. Florists' Transworld Delivery (F.T.D.)
2. Teleflora
3. Florafax
4. American Floral Services

Each organization sends its members a monthly directory or membership list. This permits a member in one state to locate another member across the state or country. The directory is organized alphabetically by state, and then by cities within the state. A separate listing is provided for each florist including the phone number, zip code (helpful in large cities), minimum charges for roses, dishgardens and arrangements, and membership number.

Each organization also provides its members with a colorful selection guide, that serves as an aid to the customer sending flowers out of town.

In order to send and receive an order, necessary information must be gathered by the florist. This includes:

1. The full name of the recipient

2. The street address, including apartment number, city, state, and zip code

3. Phone numbers (work and home)

4. Description of what is to be sent

5. A second and third choice of flowers

6. Amount of the purchase

7. Message for the enclosure card

8. Date of delivery

It is important to remember that in item 6, amount of purchase, to quote the entire price of the purchase including tax, transmittal fee, and cost of the phone call.

Often a customer will request a specific time for a delivery. Most florists will only honor an a.m. (before 12:00 noon) or p.m. (after 12:00 noon - 5 p.m.) request.

When sending an order, the florist must check the directory to make sure a florist is listed in the receiving city. Although the service is known as flowers by wire, most florists use the phone or a computer that is rented from the wire-service companies. The sending florist will call the receiving florist, relay all the information, and add any other specific instructions. Special instructions may include tips on when the customer will be home or specific directions for a hard to locate street. The order is finished when each florist exchanges names. If a problem should occur, you will have a record of the person you spoke to on the phone.

When receiving an order, the florist also will write down the name of the shop that called and its membership number.

Weekly reports are filled out by both sending and receiving florists, and sent to the organization's central clearing house. If more orders are received than sent, a florist will receive a check for the cost of the flowers. If more orders are sent than received, the florist will be billed by the wire service organization.

STUDENT WORKSHEET 1

SITE ANALYSIS

PROCEDURE: Visit a local flower shop or horticultural related business and answer the following questions.

1. Is parking available? ____________________

2. How fast does traffic pass the store? ____________________

3. On which side of the street is the shop located? ____________________

4. Does the area promote walk-in trade? ____________________

5. Where is the nearest wholesale florist located? ____________________
   ____

6. What other types of business are on the same block? ____________________
   ____

7. How long has the shop been in this location? ____________________

8. Are there other flower shops located within 5 city blocks? ____________________

9. Is the shop located near a hospital or funeral home? ____________________

10. Ask the owner if he or she selected the location or bought the business from a prior owner. ____________________
    ____

11. Ask the owner if there have been any major changes in the neighborhood, and how they affected his or her shop.________________________

____

____

12. Do delivery trucks have easy access to the shop?________________________

STUDENT WORKSHEET 2

APPLICATION FOR EMPLOYMENT

PROCEDURE: Complete the application form, and discuss what an employer will look for when hiring an employee. The application will also be evaluated on its neatness and completion.

APPLICATION FOR EMPLOYMENT

PERSONAL INFORMATION

Date

NAME
Last First Middle

PRESENT ADDRESS
Street City State Zip

PERMANENT ADDRESS
Street City State Zip

PHONE NO. SOCIAL SECURITY NUMBER

REFERRED BY

EMPLOYMENT DESIRED

POSITION DATE YOU CAN START SALARY DESIRED

ARE YOU EMPLOYED NOW? IF SO MAY WE INQUIRE OF YOUR PRESENT EMPLOYER

EVER APPLIED TO THIS COMPANY BEFORE? WHERE WHEN

Last First Middle

EDUCATION	NAME AND LOCATION OF SCHOOL	YEARS ATTENDED	DATE GRADUATED	SUBJECTS STUDIED
GRAMMAR SCHOOL				
HIGH SCHOOL				
COLLEGE				
TRADE, BUSINESS OR CORRESPONDENCE SCHOOL				

SUBJECTS OF SPECIAL STUDY OR RESEARCH WORK

U.S. MILITARY OR NAVAL SERVICE RANK PRESENT MEMBERSHIP IN NATIONAL GUARD OR RESERVES

ACTIVITIES OTHER THAN RELIGIOUS (CIVIC, ATHLETIC, FRATERNAL, ETC.)
Exclude organizations, the name or character of which indicates the race, creed, color or national origin of its members.

(CONTINUED ON OTHER SIDE)

FORMER EMPLOYERS (List below last four employers, starting with last one first.)

DATE MONTH AND YEAR	NAME AND ADDRESS OF EMPLOYER	SALARY	POSITION	REASON FOR LEAVING
From				
To				
From				
To				
From				
To				
From				
To				

REFERENCES: Give below the names of two persons not related to you whom you have known at least one year

NAME	ADDRESS	BUSINESS	YEARS ACQUAINTED
1			
2			

PHYSICAL RECORD:

List any physical defects

WERE YOU EVER INJURED? GIVE DETAILS

HAVE YOU ANY DEFECTS IN HEARING? IN VISION? IN SPEECH?

IN CASE OF EMERGENCY NOTIFY Name Address Phone No

I AUTHORIZE INVESTIGATION OF ALL STATEMENTS CONTAINED IN THIS APPLICATION. I UNDERSTAND THAT MISREPRESENTATION OR OMISSION OF FACTS CALLED FOR IS CAUSE FOR DISMISSAL. FURTHER, I UNDERSTAND AND AGREE THAT MY EMPLOYMENT IS FOR NO DEFINITE PERIOD AND MAY, REGARDLESS OF THE DATE OF PAYMENT OF MY WAGES AND SALARY BE TERMINATED AT ANY TIME WITHOUT ANY PREVIOUS NOTICE.

DATE SIGNATURE

DO NOT WRITE BELOW THIS LINE

TO BE COMPLETED DAY EMPLOYMENT BEGINS DATE

HEIGHT WEIGHT AGE DATE OF BIRTH

SINGLE MARRIED WIDOWED CITIZEN U.S.A. SEX

The above information needed for pension, hospitalization insurance, etc., and not for hiring purposes

INTERVIEWED BY DATE REMARKS

NEATNESS		CHARACTER	
PERSONALITY		ABILITY	

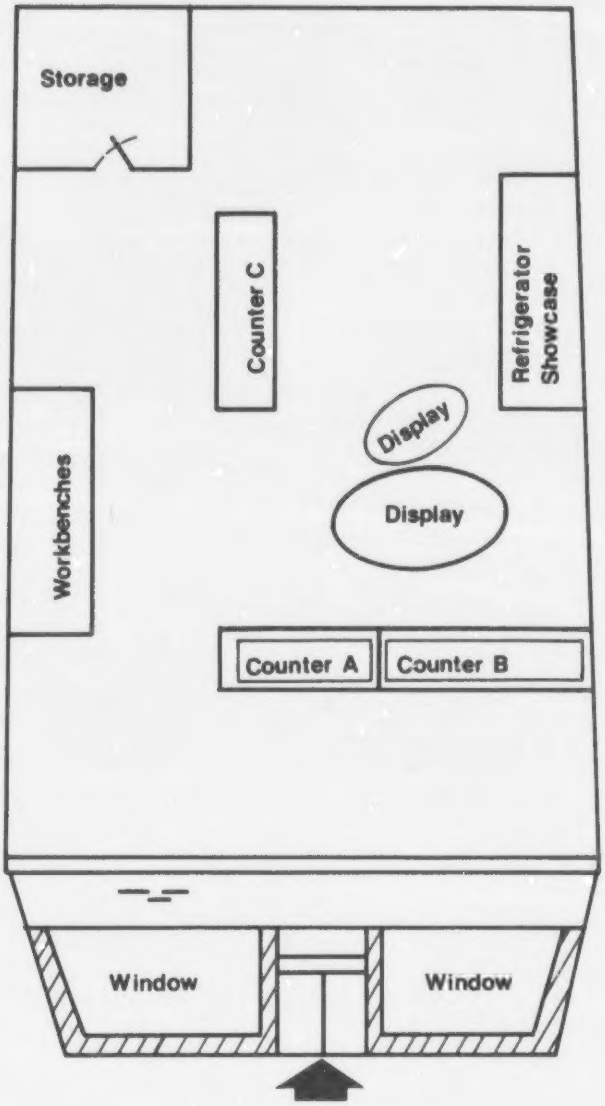
HIRED FOR DEPT POSITION WILL REPORT SALARY WAGES

APPROVED 1 Employment Manager 2 Dept. Head 3 General Manager

STUDENT WORKSHEET 3

SHOP LAYOUT AND DESIGN

PROCEDURE: Review information sheet number three and the transparency of shop layouts. Study the plan of the shop below and make any necessary corrections in the design.


Storage
Counter C
Refrigerator Showcase
Display
Display
Workbenches
Counter A
Counter B
Window
Window

LABORATORY EXERCISE 1

TRANSMITTING AND RECEIVING A WIRE ORDER

PURPOSE: The purpose of this laboratory exercise is to properly record all information necessary to transmit and receive a wire order.

MATERIALS:

1. Two order forms
2. A wire service membership list
3. A selection guide

PROCEDURE:

1. Have each student read Information Sheet 6.
2. Divide the students into pairs, and designate one as the customer and the other student as the florist.
3. Have the "customer" select an arrangement from the floral selection guide.
4. The "florist" will record the "customer's" selection and all other required information on the order form enclosed with this exercise.
5. The "florist" will select a receiving shop from the wire service membership list, and record the receiving shop's name, phone number, and membership number on the back of the order form.
6. The student that was the "customer" will now act as the "receiving florist" and record the information on another order form.
7. The receiving-florist will record the sending florist's name, the clerk's name, and the sending florist's membership number on the back of his or her order form.

LABORATORY EXERCISE 1 (Cont'd)

WEEKLY WIRE ORDER REPORT FORM

Floral Order Delivery Report - For Week Ending________________

Shop Name________________

Address________________

City & State________________ Zip Code__________

Report Only Incoming Floral Orders On This Form

Codes:

1. Sympathy
2. Hospital
3. Birthday-Aniversary
4. Business Gift
5. Holiday
6. Other

	Sending Florist Code Number	Amount of Order	Delivery Date	Recipient's Last Name	Occasion Code
01					
02					
03					
04					
05					
06					

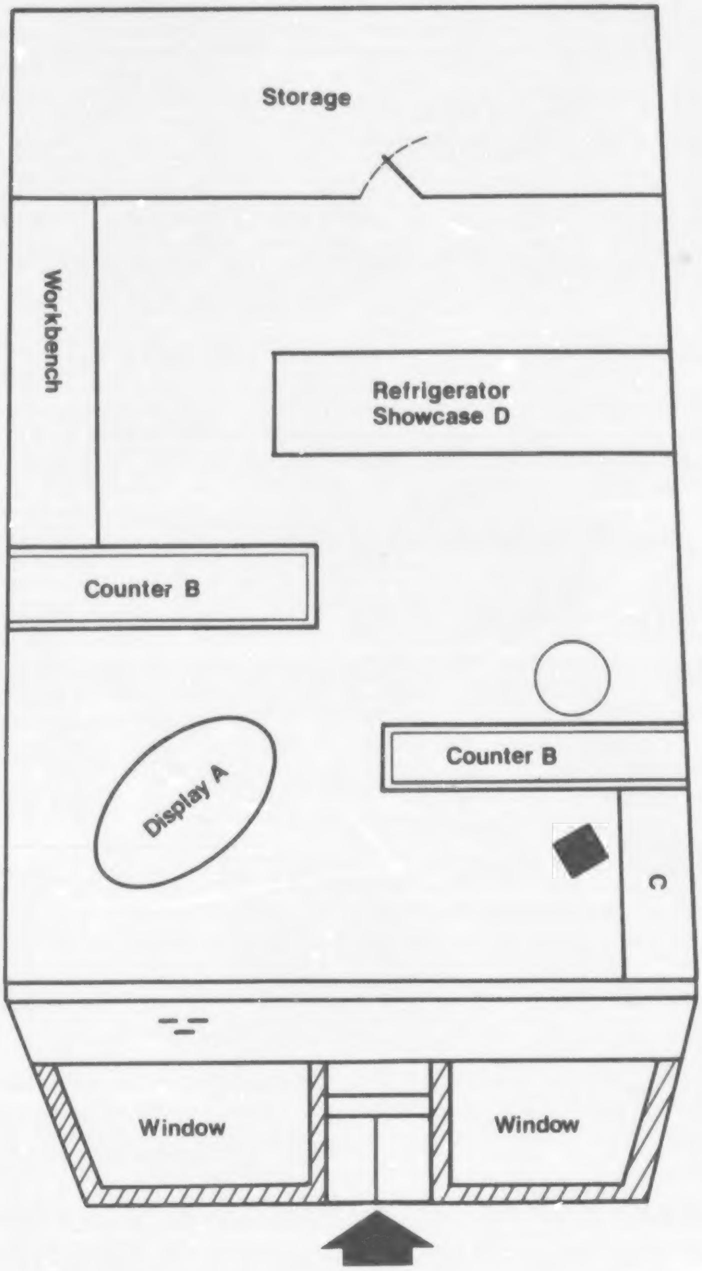
TEACHER'S KEY

STUDENT WORKSHEET 3

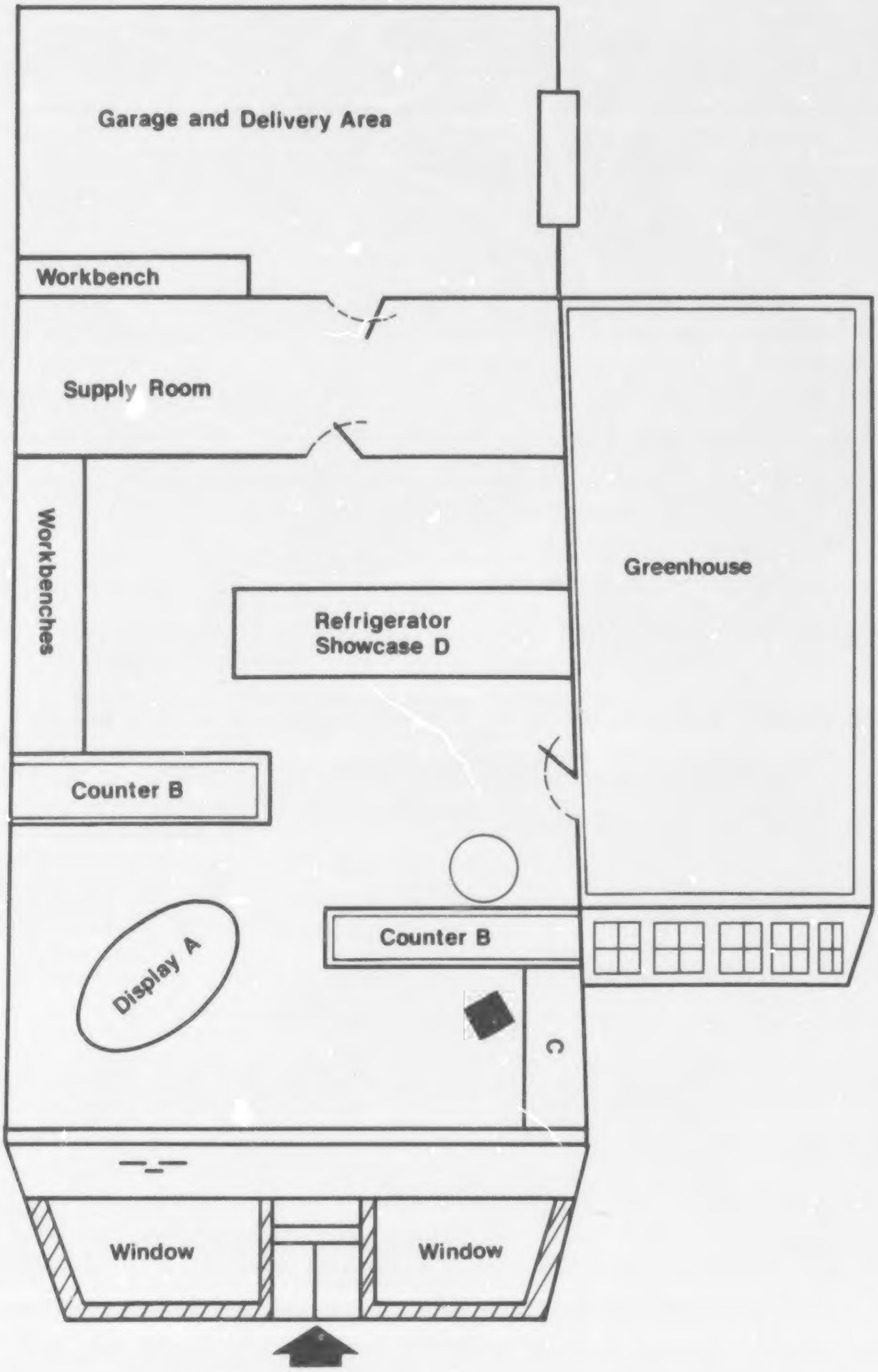
SHOP LAYOUT AND DESIGN

1. Counters A and B are too close to the front door and block the flow of traffic.
2. Counters A and B block the view through the shop.
3. All of the displays are too close to each other.
4. The work area is located too far from the storage and supply area.
5. The storage area is too small.
6. The refrigerator is blocked by the displays.

NEIGHBORHOOD SHOP, FLOOR PLAN A


Storage
Workbench
Refrigerator Showcase D
Counter B
Counter B
Display A
C
Window
Window

NEIGHBORHOOD SHOP, FLOOR PLAN B


Garage and Delivery Area
Workbench
Supply Room
Workbenches
Greenhouse
Refrigerator
Showcase D
Counter B
Counter B
Display A
C
Window
Window

PETTY CASH SLIP

Amount__________ No.________

RECEIVED OF PETTY CASH

________________19__

For ____________________________

Charge to ________________________

____

Approved by ____________ Received by ____________

DAILY SUMMARY

Cash Receipts

1. Cash Sales $
2. Miscellaneous Receipts
3. Total Receipts to be Accounted For

Cash On Hand

4. Cash in Register:
   - Coins
   - Bills
   - Checks
   - Total Cash in Register
5. Less: Change Fund
6. Total Cash to be Deposited
7. Receipts to be Accounted For
8. Cash Short (item 7 greater than item 6)
9. Cash Over (item 7 less than item 6)

Total Sales

10. Cash Sales

BALANCE SHEET: As of 12/31/00

ASSETS		LIABILITES	
Cash	5,000	Accounts Payable	4,000
Inventory	25,000	Notes Payable	6,400
Supplies	500	Taxes Payable	500
Furniture & Fixtures	2,000		
			10,900
Prepaid Insurance	300		
	$32,800	Owner's Equity	21,900
		Total Liabilities & Owner's Equity	$32,800

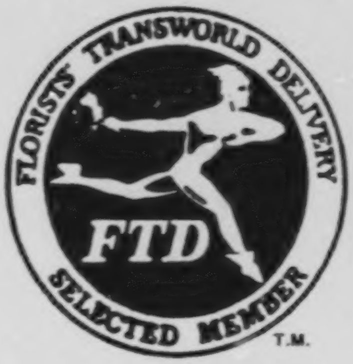
INCOME STATEMENT

INCOME STATEMENT

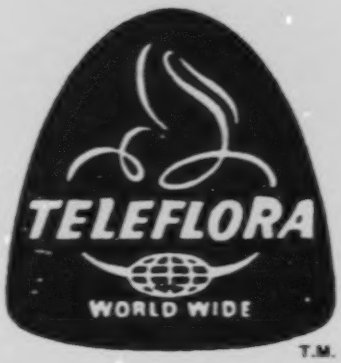
Month of ________, 19__ and __ months ended ________, 19__

	This Month		Year to Date	
	Amount	Percent of Sales	Amount	Percent of Sales
1. Net Sales	$ ______	100	$ ______	100
Less Cost of Goods Sold:				
2. Beginning Inventory	______		______	
3. Merchandise Purchases	______		______	
4. Merchandise Available for Sale	______		______	
5. Less Ending Inventory	______		______	
6. Cost of Goods Sold	______	______	______	______
7. Gross Margin	______	______	______	______
Less Expenses:				
8. Salaries and Wages	______		______	
9. Rent	______		______	
10. Utilities	______		______	
11. Repairs and Maintenance	______		______	
12. Delivery Expense	______		______	
13. Supplies	______		______	
14. Promotion	______		______	
15. Depreciation	______		______	
16. Bad Debts	______		______	
17. Taxes	______		______	
18. Insurance	______		______	
19. Interest	______		______	
20. Other Expense	______		______	
21. Total Expenses	______	______	______	______
22. Operating Profit (Loss)	______	______	______	______

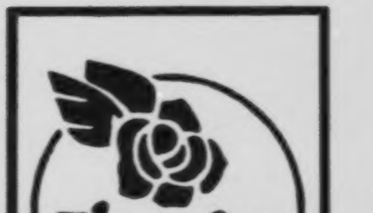
WIRE SERVICE ORGANIZATION SYMBOLS


FLORISTS' TRANSWORLD DELIVERY
FTD
SELECTED MEMBER
T.M.

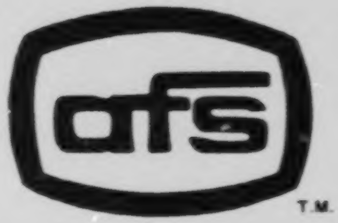
FLORISTS' TRANSWORLD DELIVERY


TELEFLORA
WORLD WIDE
T.M.

TELEFLORA


Florafax
T.M.

FLORAFAX



AMERICAN FLORAL SERVICES

FLOWER SHOP ORDER FORM

Your Flower Shop
2345 West Fourth Street
Anytown, USA 00000
(000)000-0000

Deliver to ____
Address __________________________________ Apt. _____
City __________________________ Phone No. __________
State __________________________ Zip code __________

Delivery Date
A.M. P.M.

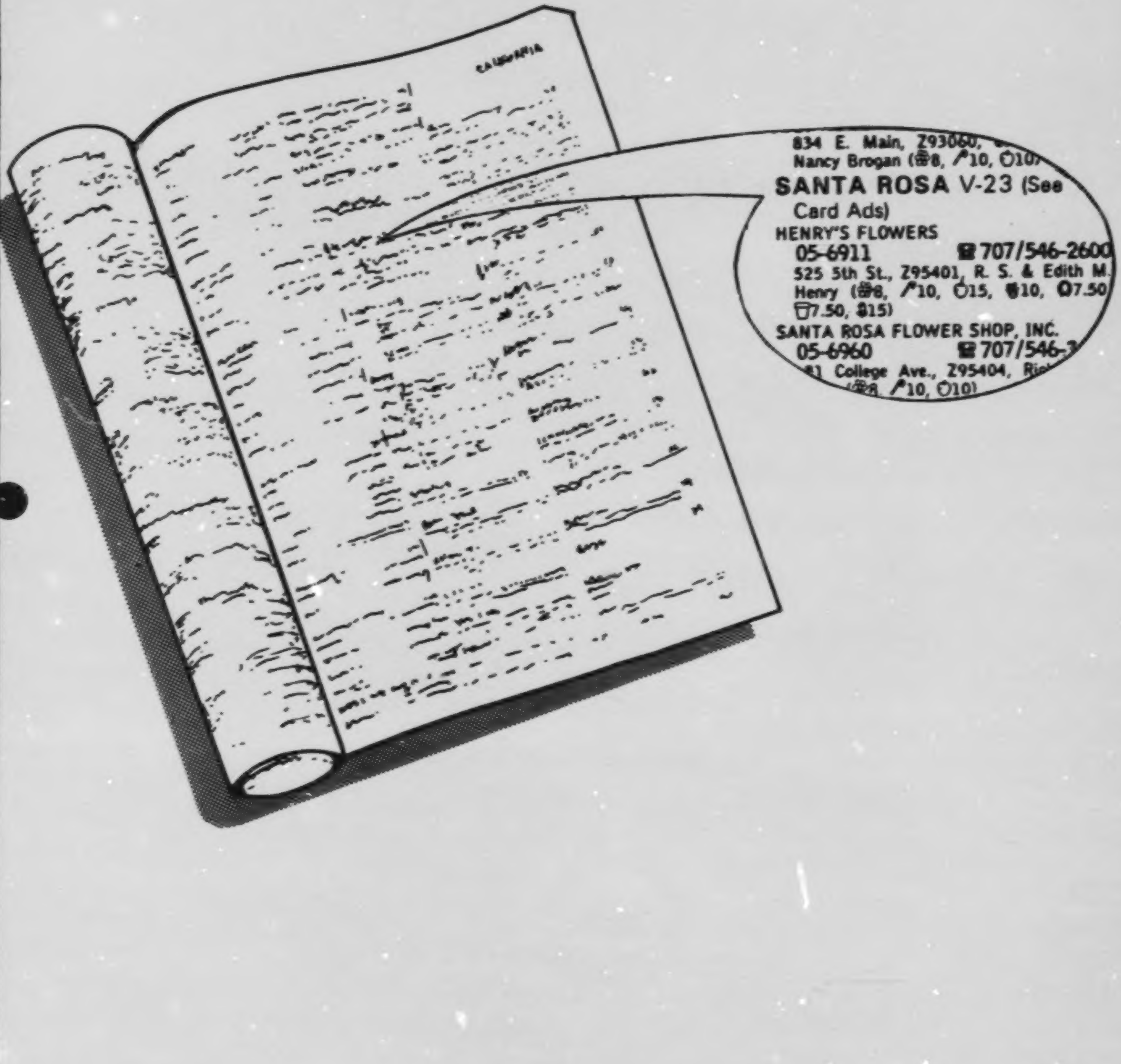
Quantity	Description	Amount
	Del. chg.	
	Sales tax	
Thank you!	TOTAL	

Birthday	Anniver.	Congrat.	Baby congrat. Boy Girl	Holiday	Sympathy	Speedy Rec'y	Others

Card ____

Sold to ____
Address _______________________________ Phone No. __________
City & State _____________________________ Zip __________
Ordered by ____

WIRE SERVICE MEMBERSHIP LIST



834 E. Main, Z93060,
Nancy Brogan (🎂8, ✎10, ○10

SANTA ROSA V-23 (See Card Ads)

HENRY'S FLOWERS
05-6911 ☎ 707/546-2600
525 5th St., Z95401, R. S. & Edith M. Henry (🎂8, ✎10, ○15, ●10, ○7.50 ▽7.50, $15)

SANTA ROSA FLOWER SHOP, INC.
05-6960 ☎ 707/546-
81 College Ave., Z95404, Ri
(🎂8, ✎10, ○10)

TRANSPARENCY DISCUSSION GUIDE

OPERATING A RETAIL FLOWER SHOP

I. Transparency--NEIGHBORHOOD SHOP FLOOR PLAN A

A. The displays in the shop should entice the customer to walk through the shop. Sufficient space should be left in between each display so a customer can move through the shop easily.

B. Work benches should be located close to the storage and supply area to promote efficiency.

C. Movable displays and counters are preferred, so they can be changed regularly.

II. Transparency--NEIGHBORHOOD SHOP FLOOR PLAN B

A. A flower shop that contains a greenhouse that is accessible to customers will help promote sales.

B. A garage attached to the work or storage area at a flower shop is very convenient during cold or poor weather. It also may serve as an additional work space during busy holidays.

III. Transparency--PETTY CASH SLIP

A. A petty cash slip is used to record small miscellaneous purchases.

B. A petty cash slip should be filled out each time money is removed from the petty cash fund.

IV. Transparency--DAILY SUMMARY

A. The daily summary is a comparison of the cash on hand and the cash receipts. The two amounts should be the same.

V. Transparency--BALANCE SHEET

A. The balance sheet summarizes the assets, liabilities, and owners equity of the flower shop.

VI. Transparency--INCOME STATEMENT

A. By completing an income statement, a florist will be able to tell if the shop is operating at a profit or a loss.

VII. Transparency--WIRE SERVICE ORGANIZATION SYMBOLS

A. Each wire order service organization can be identified by a distinctive symbol.

B. Florists usually place a decal of the organizations they belong to on their front door as advertisement.

VIII. Transparency--FLOWER SHOP ORDER FORM

A. Florists usually use a standard order form when taking orders.

B. Spaces for all the necessary information are provided for on the form.

C. Order forms may be obtained from a wholesale florist, wire service organization or business form company.

IX. Transparency--WIRE SERVICE MEMBERSHIP LIST

A. Each entry of the wire service membership list contains the flower shop's name, the member's number, the phone number and area code, the address, zip code, owner's name, and minimum prices for basic arrangements.

B. Florists may belong to as many wire service organizations as they wish to join.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

OPERATING A RETAIL FLOWER SHOP

TRUE OR FALSE:

False 1. All flower shops provide delivery service for their customers.

False 2. A grower-retailer is usually located in the business district of a community.

False 3. Location will not have a major effect on the success or failure of a flower shop.

True 4. A person should check the other types of shops in the area before signing a lease for a flower shop.

True 5. An effective layout of a flower shop will increase sales, and maximize efficiency of your employees.

True 6. The circulation area of a flower shop needs only 30 footcandles of illumination.

False 7. A petty cash slip compares the assets of a business to its liabilities.

True 8. The cash receipts and cash on hand should be the same in a daily summary.

False 9. The average shop needs one employee for every $7,000-10,000 of annual gross sales.

True 10. The first flowers-by-wire organization was formed in 1910, during a meeting of the Society of American Florists.

SHORT ANSWER:

1. List the names of 4 types of flower shops.
   a. Grower-retailer
   b. Neighborhood Shop
   c. Shopping-Mall Florist Shop
   d. Hospital Shop
2. Name 4 qualities of a good employee.
   a. thorough knowledge of merchandise
   b. courteous and friendly

   c. agreeable personality

   d. can follow instructions

3. Explain the function of a flowers-by-wire organization.

   A service provided to customers of a flower shop so they can send flowers to out-of-town friends.

4. List 3 questions you would ask when selecting a location for a flower shop.

   a. Are there parking facilities?

   b. What is the average income in the community?

   c. What are the current zoning ordinances?

5. Name 3 sources an employer of a flower shop can use to look for help.

   a. Vocational horticulture programs in local schools

   b. Professional design schools.

   c. Advertise in the local paper

6. Name 2 flowers-by-wire organizations.

   a. Florists Transworld Delivery

   b. Teleflora

DEFINE THE FOLLOWING TERMS:

1. Storefront - identifies the business, and contains an eye catching display. The entrance should provide easy access to the customer.

2. Daily Summary Sheet - a comparison of the cash-on-hand to the daily receipts. The two amounts should be the same.

3. Walk-in Traffic - the number of people that walk past a flower shop that become potential customers after seeing an eyecatching display.

4. Vignettes - a spot in the sales area where a special item is displayed. It is usually highlighted with a spotlight.

5. Foot Candle - illumination falling on a surface 12 inches by 12 inches in size, from a candle one foot away.

6. Wire Service Selection Guide - a book that customers use when selecting a flower arrangement or plant for an order.

ESSAY:

1. Describe the procedure for taking a wire order.

   Record the full name and address of the recipient, including the phone number. Describe the item to be sent, and include a second and third choice.

   Be sure to add all service charges and tax to the bill. Record the message for the enclosure card and the type of card the customer desires. Record the date the item is to be delivered, and then look up a receiving florist from the wire service membership list.

2. Why should a florist keep accurate records?

   To make sure the business is operating profitably and for tax purposes.

UNIT N: Horticulture Business Management

PROBLEM AREAS:

1. Understanding the four common ways of organizing a business
2. Selling horticultural products
3. Marketing horticultural products
4. Utilizing microcomputers in horticulture business management

UNIT N: HORTICULTURE BUSINESS MANAGEMENT

PROBLEM AREA: UNDERSTANDING THE FOUR COMMON WAYS OF ORGANIZING A BUSINESS

SUGGESTIONS TO THE TEACHER:

This problem area is designed to provide junior or senior students with a background in how business operates in a free enterprise system. All students need to know how American businesses are organized and operated. As you discuss this subject with your class do not leave farms and other small businesses out of your discussion because they represent the largest and most important example of the sole proprietorship and partnership form of business in many communities.

Cooperative businesses are an important part of the American economic system and cooperative organizations are important in American life. There is a tendency to associate cooperatives with farmers. Actually, both farmers and city people use and are benefited by cooperatives. Millions of Americans read Associated Press articles, belong to a credit union or health organization or buy citrus fruit with the Sunkist label. These organizations, services and products are part of the cooperative movement in America.

Approximately one week of instructional time should be scheduled for this problem area. It can be taught any time during the academic year and can be incorporated into a horticulture business management course or a related class in cooperative vocational education.

Teachers should order the necessary instructional materials from Vocational Agriculture Service and supplement them with other materials from local cooperatives or other sources. If the film is to be borrowed from the Grange Farm Film Foundation, a request should be submitted early in the school year.

CREDIT SOURCES:

These materials were developed through a funding agreement, R-33-24-D-0362-466, with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed as policy or opinion of the State Board of Education or its staff.

The teacher's guide, student worksheets, and test questions were developed by Paul E. Hemp, Department of Vocational and Technical Education, University of Illinois and reviewed by Janet L. Henderson and Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Horticulture business management

II. Problem area: Understanding the four common ways of organizing a business

III. Objectives: At the close of this problem area, students will be able to:

1. Identify types of agricultural business ownership present in the local area.
2. Differentiate between partnerships and proprietorships.
3. Differentiate between corporations and cooperatives.
4. Identify local businesses which represent each of the four types.
5. Identify advantages and disadvantages of the four ways of doing business.

IV. Suggested interest approaches:

1. Explain to the class the nature and scope of this problem area. Point out the importance of learning about the different types of business organization to (a) those who plan to own a business someday and (b) those who will be patronizing businesses in the future.
2. Have students name a variety of businesses which they patronize. List these businesses on the board and see if students can classify them as sole proprietorships, partnerships, cooperatives or corporations.
3. Ask students to recall any business-type ventures they have been involved in at school (selling seeds, operating popcorn stand, etc.) and identify the type of business organization used to carry out each activity.
4. Show the film "How People Do Business in our Democracy" or "Cooperatives - The Farmers' Way" available on a free loan basis from the Grange Farm Film Foundation (see Section IX for address).

V. Anticipated problems and concerns of students:

1. What are the different ways of doing business?
2. What is a sole proprietorship? A partnership? A cooperative? A corporation?
3. What are the distinguishing characteristics of each type of business organization?

4. What businesses in our community are corporations, sole proprietorships, partnerships, cooperatives?

5. How is a corporation owned?

6. How do partnerships work?

7. How is stock voted in a corporation? In a co-op?

8. Can a partnership be formed without one party or the other knowing it?

9. What resources are needed to operate any business?

10. What are the advantages and disadvantages of the following:
    - sole proprietorships
    - partnerships
    - corporations
    - cooperatives

11. How do these four types of businesses differ with respect to:
    - method of finance
    - how managed
    - how voting is done
    - how profits are used
    - owners' liability

12. How does the federal and state government control or regulate business activities?

VI. Suggested learning activities and experiences:

1. Conduct an interest approach to introduce this problem area and to motivate student interest. See Section IV for examples.

2. Develop instructional objectives with the class.

3. Have students identify a list of problems and concerns. Assume that the class members wish to start a business venture and are not sure which type of business to establish. Use the lead question "What do we need to know about the four ways of doing business in order to make a wise decision?"

4. Conduct supervised study. Have students search out answers after reading VAS Unit 6014.

5. Have students complete the student worksheets included with this problem area.

6. Use VAS Slidefilms 393 and 394 to provide additional information for answering questions and to build a knowledge base for this problem area.

7. Invite in or visit an owner or manager representing one or more of the four ways of doing business to explain how these types of business organizations function.

8. Use the overhead projector to diagram a chart showing the differences in the four types of business organizations.

9. Hold mock corporate director and officer elections with varying amounts of stock.

10. Hold mock co-op director and officer elections with varying amounts of stock.

11. Have students develop and operate a cooperative. Elect a board of directors and appoint a manager to conduct business and make management decisions.

VII. Application procedures:

1. Discuss with the class the opportunities they have to use a partnership arrangement with their S.O.E. program.

2. Organize a cooperative or a corporation within the FFA chapter.

3. Organize co-op sales of garden seed, pencils or bulbs or other co-op suited to the local chapter interests.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Collect and evaluate student worksheets.

IX. References and aids:

1. Vocational Agriculture Service,
Department of Agriculture
University of Illinois,
1401 South Maryland Drive
Urbana, IL 61801

    a. VAS Unit 6014-Common Ways of Doing Business.

    b. VAS Slidefilm 393 and Cassette Tape- The American Private Enterprise System.

    c. VAS Slidefilm 394 and Cassette Tape- Cooperative-Distinctive Business Corporation.

2. Films, "How People do Business in our Democracy" and "Cooperatives--The Farmers' Way", available on a loan basis from Grange Farm Film Foundation, 1616H Street, N.W., Washington, D.C. 20006

STUDENT WORKSHEET 1

LOCAL SURVEY OF BUSINESS TYPES

Identify 20 businesses in the local community and classify them as proprietorship, partnership, corporation or cooperative. Be sure to include at least three examples of each type. Try to list as many horticulture/agriculture businesses as you can. The yellow pages of the telephone directory may be helpful in developing this list.

	Name of Business	Type
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		

STUDENT WORKSHEET 2

SURVEY OF AN AGRICULTURAL BUSINESS

Interviewer____________________ Date of Interview________________

I. Business or Service

A. Name of business or service________________________________

Address______________________ County________________

B. Person interviewed______________________________________

Position______________________ Telephone ______________

C. Year this business or service was established in this locality_____

D. Estimated percent gross income that is agriculturally oriented_____

E. Major agricultural products and/or functions of this business or service____

F. Type of business (proprietorship, partnership, cooperative, corporation)____

II. Employees in this Business or Service -- Total Number______________

III. Job Titles of Employees:

	Number of Employees	
A. Existing Job Titles	Full-time	Part-time
1. ______________________	________	________
2. ______________________	________	________
3. ______________________	________	________
4. ______________________	________	________
5. ______________________	________	________
6. ______________________	________	________
B. Anticipated Job Titles		
1. ______________________	________	________
2. ______________________	________	________

STUDENT WORKSHEET 3

COMMON WAYS OF ORGANIZING A BUSINESS

(REFERENCE) - Vas Unit 6014 - Common Ways of Doing Business

1. What are the four different types of business organizations?

   a. ______________________

   b. ______________________

   c. ______________________

   d. ______________________

2. What are the characteristics of each type of business organization?

   a. ____

   b. ____

   c. ____

   d. ____

3. What are the advantages and disadvantages of each type?

   a. ____

   b. ____

   c. ____

   d. ____

4. What is the meaning of the following terms?

   legal person - ______________________________________

   ____

   charter - ______________________________________

   ____

   consumer cooperative - ______________________________

   ____

corporation - ____

____

patron - ____

____

purchasing cooperative - ____

____

5. What are the four categories of resources needed to operate a business?

a. ____

b. ____

c. ____

d. ____

6. What are some major roles of government in business activities?

____

____

____

____

____

STUDENT WORKSHEET 4

COMPARISON OF FOUR TYPES OF BUSINESS

(REFERENCE) - Vas Unit 6014 - Common Ways of Doing Business

Compare the four common types of businesses by writing in the business-type for each feature or method listed. The business types are proprietorship, partnership, corporation and cooperative.

1. Who owns the business?
    - An individual ____________________
    - Stockholders ____________________
    - Member-patrons ____________________
    - Partners ____________________
2. Who votes?
    - Common stockholders ____________________
    - Partners ____________________
    - Member patrons ____________________
    - None necessary ____________________
3. How is voting done?
    - One member - one vote ____________________
    - None necessary ____________________
    - Shares of common stock ____________________
    - Partner's share of capital ____________________
4. Who determines policies?
    - The partners ____________________
    - Stockholders and directors ____________________
    - Member patrons and directors ____________________
    - Owner ____________________
5. Are returns on ownership capital limited?
    - No ____________________
    - ____________________
    - ____________________
    - Yes ____________________
6. Who gets the operating proceeds?
    - Stockholders ____________________
    - Owners in proportion to interest in business ____________________
    - Patrons on a patronage basis ____________________

STUDENT WORKSHEET 5

CHARACTERISTICS OF FOUR WAYS OF DOING BUSINESS

(REFERENCE) - Vas Unit 6014 - Common Ways of Doing Business

In the blank provided, write in the name of the business type (proprietorship, partnership, corporation or cooperative) which fits the characteristic. Some items may apply to more than one type of business.

______________ 1. Is treated by the law as a "legal person".

______________ 2. Oldest of all forms of business enterprise.

______________ 3. Useful when two or more people have insufficient capital or know-how to operate efficiently and effectively.

______________ 4. Policy is decided by a board of directors.

______________ 5. Users of the service are also the owners.

______________ 6. Useful when a small amount of capital is required and personal service to customers is important.

______________ 7. Business is financed by sale of common stock.

______________ 8. Returns on capital are limited by law.

______________ 9. All property of owners is subject to liability action.

______________ 10. Owners have limited liability.

______________ 11. Requires least amount of legal formalities when being organized.

______________ 12. Business arrangement ceases if one owner dies or withdraws.

TEACHER'S KEY

STUDENT WORKSHEET 3

COMMON WAYS OF ORGANIZING A BUSINESS

1. What are the four different types of business organizations?

   a. Proprietorship

   b. Partnership

   c. Corporation

   d. Cooperative

2. What are the characteristics of each type of business organization?

   a. Refer to page 5 in VAS Unit 6014

   b. ______

   c. ______

   d. ______

3. What are the advantages and disadvantages of each type?

   a. Refer to VAS Unit 6014

   b. ______

   c. ______

   d. ______

4. What is the meaning of the following terms?

   legal person - a characteristic of a business which means it is treated as a person by the law.

   charter - document granted by the state which defines purposes and limits the activity of a business consumer cooperative - a cooperative which purchases and distributes goods and supplies.

corporation - an entity created by law for business purposes

patron - those who patronize a cooperative

purchasing cooperative - a cooperative used by member-patrons to purchase supplies on a cooperative basis

5. What are the four categories of resources needed to operate a business?

a. Land (natural resources)

b. Labor

c. Capital

d. Management

6. What are some major roles of government in business activities?

Provide laws and regulations

Provide protection

Provide services

Create a legal climate for business to operate

TEACHER'S KEY

STUDENT WORKSHEET 4

COMPARISON OF FOUR TYPES OF BUSINESS

Compare the four common types of businesses by writing in the business-type for each feature or method listed. The business types are proprietorship, partnership, corporation and cooperative.

1. Who owns the business?

An individual	Proprietorship
Stockholders	Corporation
Member-patrons	Cooperative
Partners	Partnership

2. Who votes?

Common stockholders	Corporation
Partners	Partnership
Member patrons	Cooperative
None necessary	Proprietorship

3. How is voting done?

One member - one vote	Cooperative
None necessary	Proprietorship
Shares of common stock	Corporation
Partner's share of capital	Partnership

4. Who determines policies?

The partners	Partnership
Stockholders and directors	Corporation
Member patrons and directors	Cooperative
Owner	Proprietorship

5. Are returns on ownership capital limited?

No	Proprietorship
	Partnership
	Corporation
Yes	Cooperative

6. Who gets the operating proceeds?

Stockholders	Corporation
Owners in proportion to interest in business	Partnership
Patrons on a patronage basis	Cooperative

TEACHER'S KEY

STUDENT WORKSHEET 5

CHARACTERISTICS OF FOUR WAYS OF DOING BUSINESS

In the blank provided, write in the name of the business type (proprietorship, partnership, corporation or cooperative) which fits the characteristic. Some items may apply to more than one type of business.

Corporation or Cooperative 1. Is treated by the law as a "legal person".

Proprietorship 2. Oldest of all forms of business enterprise.

Partnership 3. Useful when two or more people have insufficient capital or know-how to operate efficiently and effectively.

Corporation or Cooperative 4. Policy is decided by a board of directors.

Cooperative 5. Users of the service are also the owners.

Proprietorship 6. Useful when a small amount of capital is required and personal service to customers is important.

Corporation 7. Business is financed by sale of common stock.

Cooperative 8. Returns on capital are limited by law.

Partnership 9. All property of owners is subject to liability action.

Corporation 10. Owners have limited liability.

Proprietorship 11. Requires least amount of legal formalities when being organized.

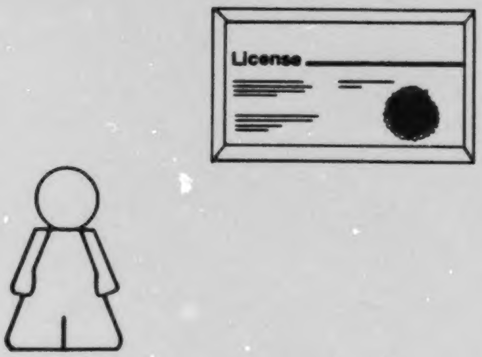
Partnership 12. Business arrangement ceases if one owner dies or withdraws.

WHAT IS A COOPERATIVE BUSINESS?

SCOTTS
SALE

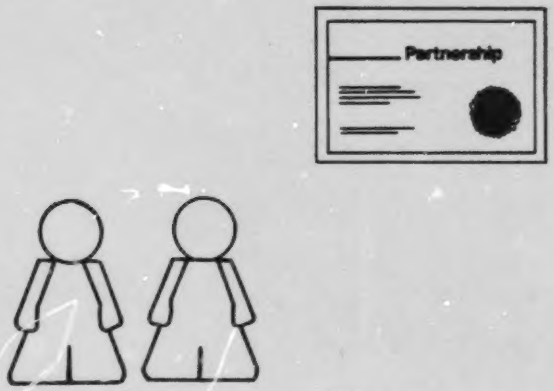
A COOPERATIVE BUSINESS IS A BUSINESS VOLUNTARILY OWNED AND CONTROLLED BY ITS USERS AND OPERATED FOR THEM ON A NONPROFIT BASIS

WHAT IS A SOLE PROPRIETORSHIP?



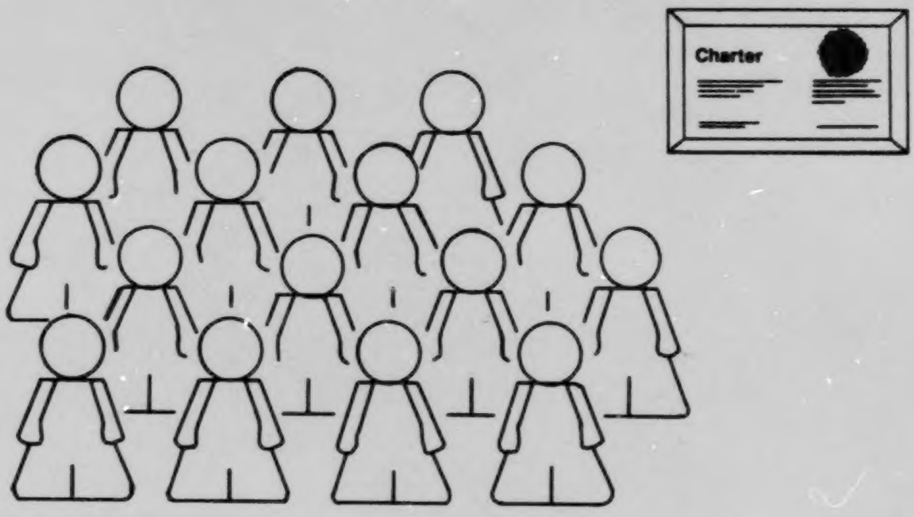
A SOLE PROPRIETORSHIP IS A TYPE OF BUSINESS ORGANIZATION WHEREBY ONE PERSON MAKES THE DECISIONS, HAS THE CAPTAL INVESTED, AND TAKES ALL THE PROFITS OR LOSSES.

WHAT IS A PARTNERSHIP?



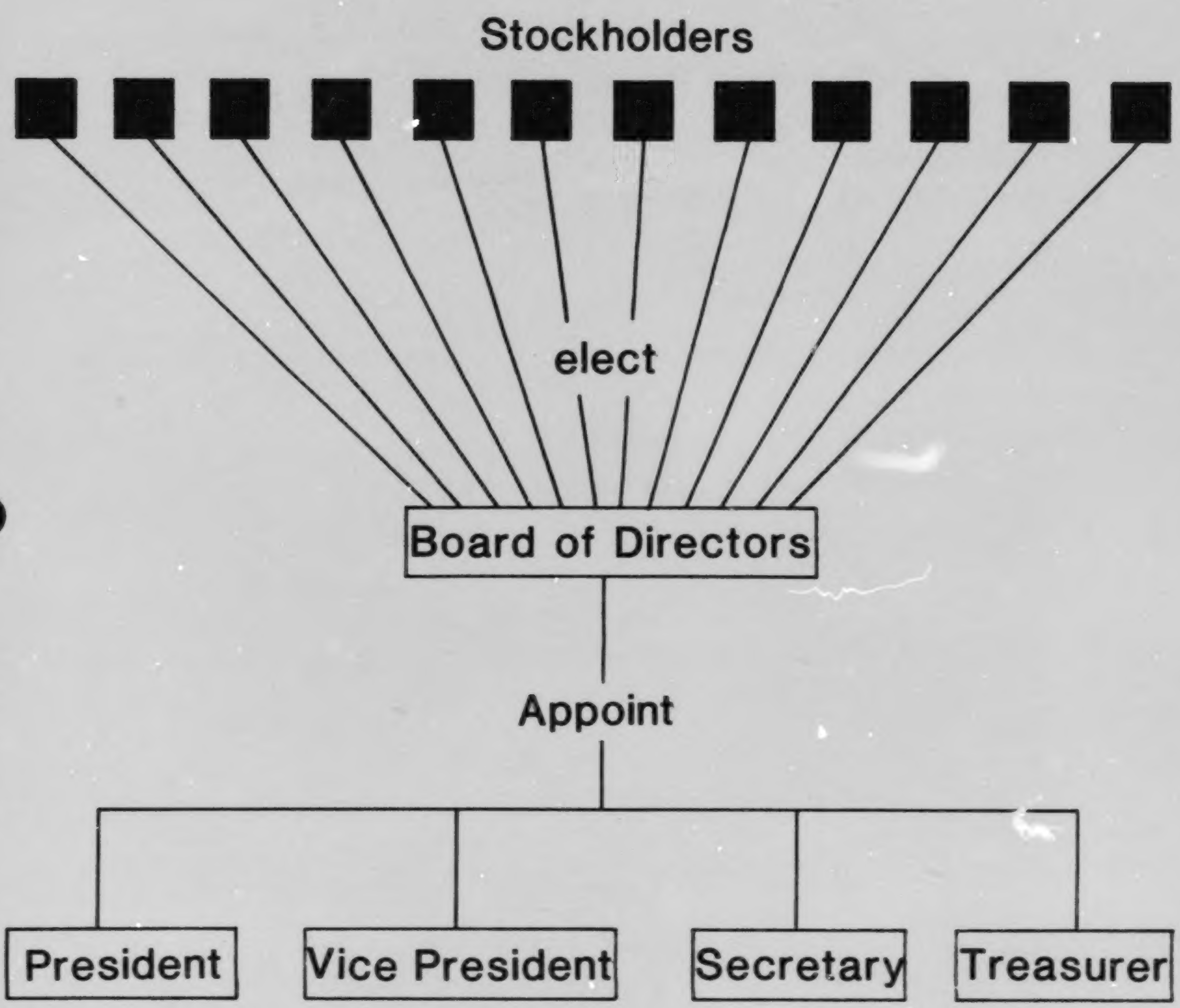
A PARTNERSHIP IS TWO OR MORE PEOPLE JOINTLY CARRYING ON BUSINESS, SHARING PROFITS AND LOSSES.

WHAT IS A CORPORATION?



A CORPORATION IS A CHARTERED BUSINESS WITH LEGAL RIGHTS TO OWN, BUY, SELL AND BORROW.

SAMPLE ORGANIZATION CHART CORPORATION BUSINESS


Stockholders
elect
Board of Directors
Appoint
President
Vice President
Secretary
Treasurer

Advantages:

1. Low start-up costs
2. Division of losses
3. Broader management base
4. Easier to establish than a corporation
5. Possible tax advantage

Disadvantages:

1. Profits divided
2. Divided authority and control
3. Lack of continuity
4. Unlimited liability
5. Difficult to find or replace a partner

Advantages:

1. Democratically controlled
2 Service at cost
3. Member owned and financed

Disadvantages:

1. Limited in scope of operation
2. Limited return on investment
3. Sources of financing limited
4. Need to educate members

Advantages:

1. Large amounts of capital can be raised
2. Limited liability
3. Separation of ownership and control
4. Continuous existence
5. Specialized management
6. Possible tax advantage

Disadvantages:

1. Most expensive to start
2. Closely regulated
3. Extensive records required
4. Double taxation

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

UNDERSTANDING THE FOUR COMMON WAYS OF ORGANIZING A BUSINESS

MATCHING:

1. Match the basic forms of business ownership with the definition on the right.

Column I		Column II
C Proprietorship	A.	Business owned by two or more persons
A Partnership	B.	Business authorized by law for benefit of stockholders
B Corporation	C.	Business owned and managed by one person
D Cooperative	D.	Business authorized by law for benefit of participating stockholders

2. Distinguish between advantages (A) and disadvantages (D) of a proprietorship by placing the correct letter in the blanks.

   a. D Difficult to raise capital

   b. A Low taxes

   c. D Unlimited liability

   d. A Personal pride of ownership

   e. A Easy to organize and terminate

   f. A Few government regulations

   g. D Lack of assistance in business operations

   h. A Freedom of action

3. Distinguish between advantages (A) and disadvantages (D) of a partnership by placing the correct letter in the blank provided.

   a. A Operating economics

   b. D Sharing profits

   c. A Increased sources of capital

   d. D Unlimited liability

   e. D Risk of liquidation

   f. D Possibilities of disagreement

   g. A Division of responsibilities

4. Distinguish between advantages (A) and disadvantages (D) of a corporation by placing the correct letter in the blank provided.

    a. A Only designated officers can make contracts

    b. D Sharing of profits

    c. A Ownership easily transferred

    d. A Limited liability

    e. D No freedom of action

    f. D Complicated and costly to organize

    g. A Variety of skills, abilities and ideas

5. Distinguish between correct (C) and incorrect (I) statements concerning how a corporation is organized and operated. Place the correct letter in the blanks provided.

    a. C Ownership is divided into parts of capital stock called shares.

    b. I Officers in small corporations generally consist of president vice-president and public relations officer.

    c. I Stockholders manage the business directly.

    d. I Officers may not employ additional persons to operate the business without expressed consent of the board of directors.

    e. C Stockholders own the business.

MULTIPLE CHOICE:

1. A basic cooperative principle is:

    *a. Voting rights are limited--usually one member, one vote.
    b. Business shall be done for cash and credit.
    c. Political and religious neutrality is not observed.
    d. Volume of business of each member shall be limited.

2. The three most generally accepted cooperative "principles" are:

    a. Open membership, political and religious neutrality, and cash trading.
    b. Democratic control, open membership, and limited returns to capital.
    *c. Limited membership, democratic control, and patronage refunds.

3. An example of a purchasing cooperative is a:

   a. Creamery.
   b. Insurance company.
   c. Dairy herd improvement association.
   *d. Farm supply company.

4. In a cooperative, the benefits normally go to:

   *a. Patrons in proportion to use.
   b. One vote for each share of stock.
   c. Stockholders according to investment.
   d. Employees according to work performed.

5. The right to incorporate is legally granted by:

   a. Federal government
   b. County government
   *c. State government
   d. Federal Trade Commission

6. Voting rights in a corporation type business are granted to:

   a. One vote per shareholder
   b. One vote for each member of Board of Directors
   *c. One vote per share of stock owned
   d. Patrons who do business with the corporation

7. In a cooperative, control of the organization is vested in its members usually by:

   *a. Each member having one vote.
   b. One vote for each share of stock.
   c. Voting in proportion to patronage.
   d. Voting in proportion to business size.

8. The largest number of businesses in the American private enterprise system are:

   *a. Proprietorship businesses.
   b. Partnership businesses.
   c. Cooperative businesses.
   d. Corporation businesses.

9. In a partnership business:

   a. The number of partners is usually limited by law.
   b. The primary purpose is to provide more employment opportunities.
   *c. The partners share in the economic risks and in the economic rewards.

10. In a business which is owned by one individual (single proprietorship):

a. The primary purpose is to be of service to the public or the community.
b. The primary purpose is to provide employment for deserving persons.
*c. The individual bears the business risks and reaps the profits (or losses).

UNIT N: HORTICULTURE BUSINESS MANAGEMENT

PROBLEM AREA: SELLING HORTICULTURAL PRODUCTS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended time for teaching this problem area is in conjunction with other problem areas in horticulture business management.

The estimated instructional time for this problem area is 4 to 5 days depending on how far the teacher wishes to go in developing salesmanship, telephone, wrapping, and delivery skills. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

These materials were developed through a funding agreement, R-33-24-D-0362-466, with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed as policy or opinion of the State Board of Education or its staff.

The teacher's guide, information sheets, student worksheet, transparency discussion guide, and test questions were developed by Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Janet L. Henderson, and Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Horticulture business management

II. Problem area: Selling horticultural products

III. Objectives: At the close of this problem area, students will be able to:

1. Identify the qualities of a good salesperson.
2. Determine the customer's needs.
3. Present merchandise and provide information to the customer.
4. Properly complete a sales transaction including:
    a. operating the register.
    b. making change.
    c. filling out sales receipts.
    d. keeping sales records.
5. Demonstrate proper telephone manners in a retail business setting.
6. Properly wrap and gift wrap customer purchases.
7. Develop a delivery routing sheet and identify proper delivery procedures.

IV. Suggested interest approaches:

1. Divide the students into small groups and have them brainstorm to produce a list of what they think makes a good or bad salesperson. Return to a large group, compile a list on the chalkboard, and discuss the characteristics listed.
2. Conduct a role play with students acting as salespersons, and the teacher acting as an undecided customer. See if the salesperson can convince the customer to buy the merchandise he/she is considering.
3. Have those students working as salespersons in retail businesses discuss the techniques they use when dealing with customers in the store.

V. Anticipated problems and concerns of students:

1. What are the qualities of a good salesperson?
2. How do I present merchandise to a customer?

3. How should I approach a prospective customer?

4. What information should I give the customer about the merchandise chosen?

5. How do I operate the cash register?

6. How do I write out a sales receipt?

7. What sales records need to be kept?

8. What are the proper telephone manners I should use?

9. How do I wrap customer purchases?

10. What is a routing sheet?

11. How do I develop a routing sheet?

12. What are the proper delivery procedures I should follow?

VI. Suggested learning activities and experiences:

1. Have the students visit local retail horticulture businesses and act like customers interested in buying particular items. Students should note the ways in which salespeople approach them, inform them about the product, and encourage them to buy it. Have each student present a short oral presentation about his/her experiences to the class.

2. Discuss good salesmanship, sales approaches, and the steps involved in a sales transaction using Information Sheets 1 and 2.

3. Invite the manager of a local retail horticulture business to class and have him/her discuss how employees are trained and instructed to deal with customers.

4. Obtain a cash register for classroom use, and allow students to practice conducting sales transactions. Play money can be used for making change. The necessary sales receipts and records should also be completed for each transaction. Use Information Sheet 3--Conducting Sales Transactions as a guide.

5. Have students review and employ basic mathematic skills in order to become more proficient at calculating change quickly and accurately. Use Student Worksheet 1 to further develop this ability.

6. Conduct a role play in which students answer simulated customer telephone calls. Use Information Sheet 4 to determine whether the students are using proper telephone manners.

7. Bring a variety of horticultural products to class (for example, gift items, plants, fresh flowers, bedding plants, and shrubs) and

demonstrate how to wrap these items for customers. Allow students to practice wrapping these products at stations set up throughout the classroom. Students should time each other and judge the quality of each other's work at each station. Use Information Sheet 5 and Transparencies 4, 5, and 6 as a guide.

8. Using a local map and several sample delivery orders, demonstrate the proper steps for developing a delivery routing sheet. Allow each student to determine what he/she thinks would be the best sequence of deliveries.

9. Have individual or small groups of students contact local garden centers or flower shops and arrange to go along with the driver during a set of deliveries. If possible, students should also participate in wrapping the products and loading the delivery vehicle. Upon completion of this activity, each student should share his/her experiences with the class.

10. Conduct a role play by having students act as customers and salespersons completing a sales transaction. Have the students fill out different types of sales receipts for their "customers". Use the transparencies in this problem area as a guide.

VII. Application procedures:

1. The main purpose of this problem area is to develop salesmanship skills that will prepare students for entry level positions in horticultural occupations. On-the-job training should be encouraged.

2. Salesmanship skills will also be beneficial to students conducting FFA or S.O.E.P. sales.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate the student worksheets.

3. Evaluate student performance during related activities.

IX. References and aids:

1. Pfahl, Peter B. The Retail Florist Business. The Interstate Printers & Publishers, Inc., Danville, Illinois, 1983.

2. State Board of Education. Retail Florist Teacher's Guide, Illinois Office of Education.

3. Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, Room 254, 2120 Fyffe Road, Columbus, Ohio, 43210.

   a. The Garden Center Worker - (Agdex 951)
   b. Retail Floriculture Book 1 - (Agdex 955)

4. Agricultural Education Service, Division of Vocational Education. Ornamental Horticulture for Vocational Agriculture in Alabama. Montgomery, Alabama, February, 1966.

5. Moine, Donald J. "Grace and Power in Telemarketing," Flowers &, April 1983, pp. 51-2.

INFORMATION SHEET 1

DEVELOPING EFFECTIVE SELLING TECHNIQUES

Good salesmanship is important to any business, but especially so within the retail horticulture industry. Flower shops and garden centers must provide a variety of services, as well as goods, to their customers. A greater amount of customer/salesperson interaction occurs in these shops because customers have many questions and need assistance in choosing the right products to fit their needs, such as flower arrangements, houseplants, fertilizer, or grass seed.

The job of salespersons is not only to sell products, but also to sell themselves, their ideas, the store, and customer satisfaction. Personality plays a key role in becoming a successful salesperson. The following are a number of desirable qualities of salespersons:

1. Self confidence. Salespersons must be able to sell themselves to customers as well as to themselves.
2. Interest. Salespersons who are interested in selling and interested in the product portray a positive image for the store.
3. Sincerity. Sincerity gives the customer confidence in the salesperson.
4. Enthusiasm. Enthusiasm can be seen in a salesperson's face, voice, and actions.
5. Cheerfulness. Cheerful salespersons will meet their customers with smiles, whether they feel like smiling or not.
6. Courtesy. A salesperson with good behavior and manners will make a good impression on the customer.
7. Initiative. Good salespersons will act on their own initiative rather than waiting to be told what to do by the employer.
8. Friendliness. A friendly salesperson will make the customer feel at ease and welcome in the store.
9. Tact. A tactful salesperson is able to smooth out differences of opinion or contradictions with the customer.
10. Persistence. Persistence is important because customers don't always immediately respond to a particular sales technique. Persistent salespersons will try again even after they seem to have failed. Good salespersons also know when to quit being persistent; customers do not respond well to pushy salespersons.

There are five steps involved in selling a product to a customer: greeting the customer, identifying customer needs, providing information, explaining and demonstrating the product, and closing the sale.

Greeting the Customer

The first 60 seconds a customer spends in a store formulate a strong impression. For this reason, it is important to greet customers at the first opportunity. When a customer comes into the shop, the salesperson should try to do all of the following:

1. Approach the customer with a smile.
2. If you are waiting on someone else, be sure to acknowledge the customer.
3. Avoid keeping the customer waiting.
4. Allow the customer to browse without feeling pressured to buy.
5. Tell the customer your name.
6. Find out the customer's name and remember it.

Identifying Customer Needs

There are three general types of customers; each type requires a different sales approach. Decided customers know what they want to buy before they ever enter the store. These customers usually require little, if any, assistance. Even if the customers do not need any help, the salesperson should greet the customers and make them feel welcome in the store.

The undecided customer comes into the store with a need for a certain type of merchandise, but doesn't know which specific product to buy. The salesperson can provide a great deal of assistance to this customer by presenting a number of options and helping evaluate which one will best suit the customer's needs.

The third type of customer is the browser. This customer is not looking for any specific type of merchandise. The customer may be interested in certain products, but doesn't plan on buying anything. The salesperson may be able to persuade this type of customer to buy at a later date by presenting merchandise and creating a desire for it. It is also important to make a good impression on these types of customers so that they will come back when ready to buy.

Providing Information

Salespersons need to know about the products they sell in order to give customers information and answer their questions. Salespersons can learn about their products by reading product labels or booklets, asking other salespersons, requesting information from the product manufacturer, or by drawing from personal experiences with the product.

The more information a salesperson can give a customer about the product, the easier the customer's buying decision will be. Give the customer any available booklets or pamphlets about the product. Offer customers a number of products within a wide price range. And always stress the benefits or advantages of the product rather than the price.

Explaining and Demonstrating the Product

Often, telling the customer about a product is not always enough. Demonstrating the product while explaining it can be much more effective. A salesperson should not only show the customers the product, but also let them hold the product in their hands. Allow the customer to get involved with the product. For example, take the customer into the cooler to see, touch, and smell the flowers. When demonstrating the use of a product, let the customer try it, too. The more contact the customers have with the product, the more the customers will feel they need it.

When explaining and demonstrating the product to the customer, the salesperson should also try to upsell the product. Upselling is selling more to the customer than he/she had planned to buy. Upselling may be selling the customer a higher priced product with more features, or selling accessories to go along with the product. A salesperson must remember to upsell for the customer's benefit, not for his/her own.

Closing the Sale

Once the customers have made up their minds to buy a product, the salesperson should complete the sale in a quick, efficient, and friendly manner. Remember, until customers have paid for their merchandise and left the store, they may still change their minds. The salesperson should not keep the customer waiting while he/she answers phone calls or looks for a pen. The salesperson should make it easy for the customers to buy, and make the customers happy about their buying decision.

INFORMATION SHEET 2

DO'S AND DON'TS OF GOOD SALESMANSHIP

DO greet each customer with a smile.

DO know your products and be able to provide information about them.

DO determine your customer's needs right away.

DO find out your customer's name and remember it.

DO tell the customer your name.

DO create customer interest in your products.

DO sell benefits and quality rather than price.

DO believe in what you are selling.

DO show interest and enthusiasm toward your products.

DO keep pens, order forms, brochures, and other materials conveniently located.

DON'T keep the customer waiting unnecessarily.

DON'T be distracted by phone calls or other salespersons.

DON'T argue with or contradict the customer.

DON'T interrupt other salespersons while they are waiting on customers.

DON'T beg the customer to buy.

DON'T act cold or impersonal toward the customer.

DON'T make the customer a promise you can't keep.

DON'T apologize about the price of a product.

DON'T take up too much of the customer's time.

DON'T smoke, eat, or chew gum in front of customers.

INFORMATION SHEET 3

CONDUCTING SALES TRANSACTIONS

There are four general steps involved in conducting a sales transaction: operating the register, making change, filling out sales receipts, and keeping accurate sales records. It is important for a salesperson to understand and follow the correct procedures for conducting sales transactions so that losses or mistakes are avoided.

Operating the Register

There are a number of different types of cash registers used in retail businesses. Some are the manual type which require the salesperson to input each item individually, and to compute the sales tax by him/herself. Most modern retail businesses now use electronic registers which calculate everything themselves. No matter which type of register is used, the procedure is about the same.

1. Before entering any prices, the salesperson may have to enter an employee code number to make the machine operate.
2. Enter the price of the item using the numerical keys. If there are several items at the same price:
    a. enter the number of items using the numerical keys.
    b. press the quantity key.
    c. press the single price of the items using the numerical keys.
3. Press the department key that corresponds with the item.
4. Repeat steps 1 through 3 for all items being purchased.
5. Press the subtotal key and figure the sales tax based on this number.
6. Enter the amount of tax using the numerical keys.
7. Press the tax key.
8. Press the total key. (NOTE: Most electronic registers will complete steps 5 through 8 by pressing only the total key.)
9. Enter the amount paid by the customer using the numerical keys.

NOTE: If a mistake is made during a sales transaction (ex., overring, underring, or wrong department code), void the sale according to store policy and begin ringing the transaction again.

10. Press the appropriate amount tendered key (cash, check, or charge). The register will then display the amount of change due, open the cash drawer, and produce a receipt.

Making Change

Making change is an important part of the sales transaction. A salesperson must be able to calculate change quickly and should use the following procedure to insure accuracy:

1. Always calculate change verbally so that the customer is reassured.
2. Place the customer's money above the cash drawer so both you and the customer remember how much money was received.
3. Count out the change starting from the total price to reach the amount the customer paid. In other words, start with pennies and nickels and end with dollar bills.
4. Place the money received from the customer in the cash drawer; close the drawer.
5. Give the receipt to the customer.
6. Thank the customer with a smile.

Filling Out Sales Receipts

There are several types of sales receipts which a salesperson may need to use, depending on the particular business and type of payment.

1. Cash - Most cash receipts are printed by the register. Some types of purchases, such as flower orders or perishable merchandise, may require a written receipt specifying special terms of the sale.

   A written receipt will include:

   a. customer's name and address
   b. date
   c. salesperson's initials
   d. method of payment
   e. quantity, description, and price of merchandise
   f. total sale
   g. customer's signature

2. Check - The receipt for a sale paid for by check will be the same as the receipt for a cash sale. However, when receiving payment by check, the salesperson will need to collect some additional information from the customer. The following procedure should be followed:

a. Make sure the correct date, amount, and signature are on the check.

b. Make sure the name of the bank and the customer's name are printed on the check.

c. Write the customer's address and telephone number on the back of the check if it is not printed on the front.

d. Obtain the customer's driver's license and 2 other forms of identification. Write these numbers on the back of the check.

e. Make sure the customer's name is not on the bad check list. Initial the check.

3. Credit Card - The following steps should be used to fill out a charge receipt:

   a. Imprint the credit card onto the receipt.

   b. Check the expiration date on the credit card to be sure it has not expired.

   c. Fill in the quantity, description, and price of the merchandise.

   d. Fill in the subtotal, tax, and total.

   e. Fill in the date and initial the form where appropriate.

   f. Obtain the customer's signature and phone number and compare the signature to the one on the credit card.

   g. If the sale is for over $50.00, obtain an authorization by calling the appropriate credit authorization center.

Keeping Sales Records

A copy of every sales receipt must be kept for bookkeeping purposes. Most cash registers have a journal inside which records every sales transaction on the machine. Sales receipts and charge receipts are filled out on forms which provide 2 or 3 carbon copies. It is vitally important for all of these sales records to be kept in a safe place. At the end of each day, these receipts will be collected by the manager along with the money from the cash register.

INFORMATION SHEET 4

TELEPHONE MANNERS

Many retail horticulture businesses sell a large amount of merchandise over the phone. This is especially true in flower shops where many customers call to place flower orders rather than coming into the shop. Customers also make frequent calls to ask questions about merchandise, prices, sales, or store hours. It is important to develop good telephone manners so that customers will enjoy doing business with you. The following telephone practices should be used by every employee in the shop:

1. Answer the phone as quickly as possible. The phone should not be allowed to ring more than twice.
2. Greet the caller appropriately ("Good morning," "Good evening") and give the name of the shop as well as your own name.
3. Try to talk like your customer. For example, if the customer speaks loudly and at a fast rate, try to do the same.
4. Try to determine the customer's mood and synchronize your conversation to within that mood.
5. Speak clearly and use good English.
6. If you must leave the phone, excuse yourself and put the customer on hold.
7. Know your products and their prices so you can answer customer questions.
8. Keep copies of price lists and sale ads near the phone.
9. Make several suggestions to help the customer decide; mention specials when appropriate.
10. Describe merchandise so that the customer can visualize it.
11. Locate the telephones in a quiet area of the shop.
12. Do not cough or chew gum while on the telephone.
13. Ask the customer if there is anything else you can do for them.
14. Let the customer be the first to hang up the phone.

INFORMATION SHEET 5

WRAPPING AND DELIVERING HORTICULTURAL PRODUCTS

Wrapping

The main horticultural products that require special types of wrapping are those sold in flower shops. Gift items need to be boxed and gift wrapped; floral items need to be wrapped in paper or tissue. The following steps explain the proper ways to wrap various types of floral items.

A. Cut Flowers

1. Lay several pieces of foliage onto a piece of colored wax paper or tissue paper; stems pointing toward a corner of the paper.
2. Lay the flowers on top of the foliage in an orderly manner; again, stems pointing toward the corner.
3. Cover the flower stems with a few smaller pieces of foliage.
4. Fold the bottom corner of the paper over the stems. Fold one side of the paper over the flowers, and roll the rest of the paper around the flowers.
5. Staple the paper to hold the wrapping.

B. Cut Flowers in a Box

1. Line the box with tissue or wax paper.
2. Wrap a small piece of wet foam in foil and place it in the bottom end of the box.
3. Lay several pieces of foliage in the box with stems pointing toward the foam block.
4. Lay the flowers on top of the foliage in overlapping rows. All stems should be inserted into the foam block.
5. Place a floral preservative and care tag in the box and fold the paper over the flowers.
6. Cover the box and tie a ribbon around the top.

C. Floral Arrangements, Plants, and Dish Gardens

1. Place the item in a box lined with tissue paper.
2. Place the box on the support of a sleeve platform.
3. Pull a single sleeve up and over the top of the boxed item.

4. Close the top of the sleeve, fold over, and staple.

D. Bouquets, Corsages, and Boutonnieres

1. Place the item inside a plastic bag.

2. Fold over the end of the bag and staple it shut.

3. Place the item in a box lined with tissue paper.

4. Cover the box and tie a ribbon around the top.

Delivery

The delivery services provided by horticultural businesses are an important part of the customer services these stores provide. A good delivery person must know how to load the delivery vehicle, route delivery orders, and accommodate customers during delivery.

It is important to remember that when the delivery person and delivery vehicle are on the road, they are representing your company. The delivery person must look clean and neat, and act friendly and courteous, in order to make a good impression on customers.

A. Loading the Delivery Vehicle

1. Trees and Shrubs: Most trees and shrubs are sold balled and burlapped. These plants should be handled by the ball, not the trunk, during loading, and secured in the truck to prevent them from rolling. Some trees and shrubs are sold as bareroot plants. These plants should be wrapped in polyethylene bags or wet burlap. Large plants may be set in a bed of wet sawdust and set down to protect them during delivery.

2. Floral Products: When loading floral products into the delivery vehicle, be very cautious not to turn the packages on their sides or brush them against walls and doorways. Racks, braces, and sand bags may all be used inside the delivery vehicle to prevent the packages from sliding around or tipping during transport. Also, the packages should be arranged so that the first ones to be delivered are the closest to the door.

B. Routing Deliveries

Delivery routes are determined according to the date, time, and destination of each individual delivery. The following steps should be used to plan every delivery route.

1. Gather the delivery orders and group deliveries going to the same area.

2. Use a map to pinpoint each delivery location.

3. Determine the sequence of delivery that will require the least time and backtracking.

4. Write the route on a delivery sheet to be used by the driver.

C. Delivering Packages

1. Make deliveries to the front door unless otherwise requested.

2. If the customer is not at home, leave the package with a neighbor or take it back to the shop. In either case, leave a note on the door to let the customer know where the package was taken.

3. Have change available when delivering packages C.O.D. (cash on delivery).

4. Attach a card to all fresh flower deliveries directing the customer to add water to the flowers.

5. Keep supplies in the delivery vehicle in case any repairs must be made to the packages.

6. Keep a tool kit and first aid kit in the delivery vehicle in case of trouble.

7. Always park the delivery vehicle legally and obey traffic laws.

8. Lock the delivery vehicle while unattended.

STUDENT WORKSHEET 1

MAKING CHANGE

PROCEDURE: Calculate the change due for each of the problems below. Use the smallest number of coins and bills possible.

	Total Sale	Customer Payment	Change Due in Coins				Change Due in Currency				Total Change
			1¢	5¢	10¢	25¢	$1	$5	$10	$20	
1.	$ 2.61	$ 5.00									
2.	3.51	10.01									
3.	32.50	50.00									
4.	.64	1.00									
5.	15.13	20.00									
6.	28.25	50.00									
7.	13.26	15.01									
8.	102.95	120.00									
9.	6.79	10.00									
10.	1.09	5.00									
11.	7.43	20.43									
12.	8.99	10.04									
13.	20.49	30.34									
14.	.36	10.00									
15.	12.59	50.00									

TEACHER'S KEY

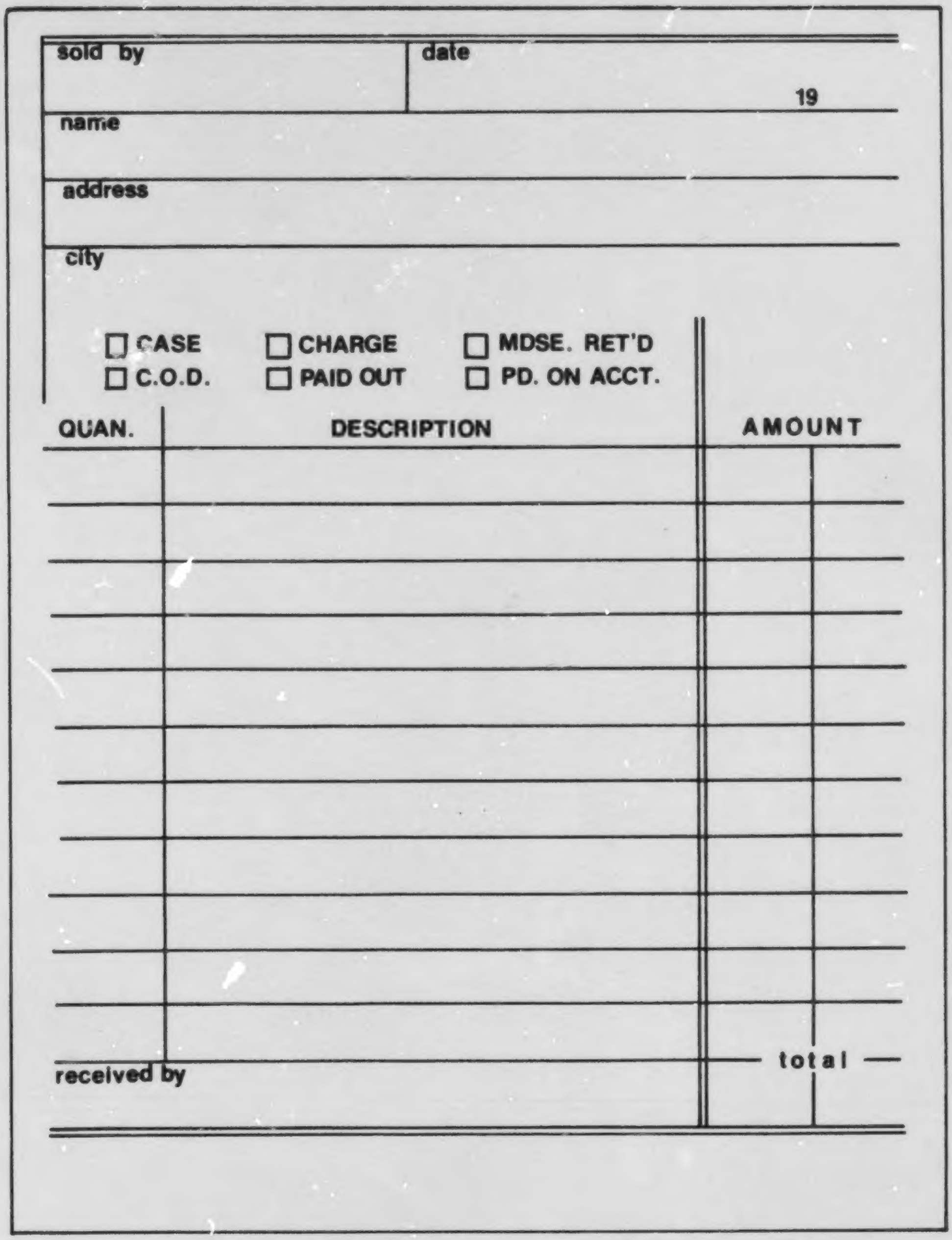
STUDENT WORKSHEET 1

MAKING CHANGE

PROCEDURE: Calculate the change due for each of the problems below. Use the smallest number of coins and bills possible.

	Total Sale	Customer Payment	Change Due in Coins				Change Due in Currency				Total Change
			1¢	5¢	10¢	25¢	$1	$5	$10	$20	
1.	$ 2.61	$ 5.00	4		1	1	2				$ 2.39
2.	3.51	10.01				2	1	1			6.50
3.	32.50	50.00				2	2	1	1		17.50
4.	.64	1.00	1		1	1					.36
5.	15.13	20.00	2		1	3	4				4.87
6.	28.25	50.00				3	1			1	21.75
7.	13.26	15.01				3	1				1.75
8.	102.95	120.00		1			2	1	1		17.05
9.	6.79	10.00	1		2		3				3.21
10.	1.09	5.00	1	1	1	3	3				3.91
11.	7.43	20.43					3		1		13.00
12.	8.99	10.04		1			1				1.05
13.	20.49	30.34			1	3	4	1			9.85
14.	.36	10.00	4		1	2	4	1			9.64
15.	12.59	50.00	1	1	1	1	2	1	1	1	37.41

SAMPLE SALES RECEIPT



sold by

date 19

name

address

city

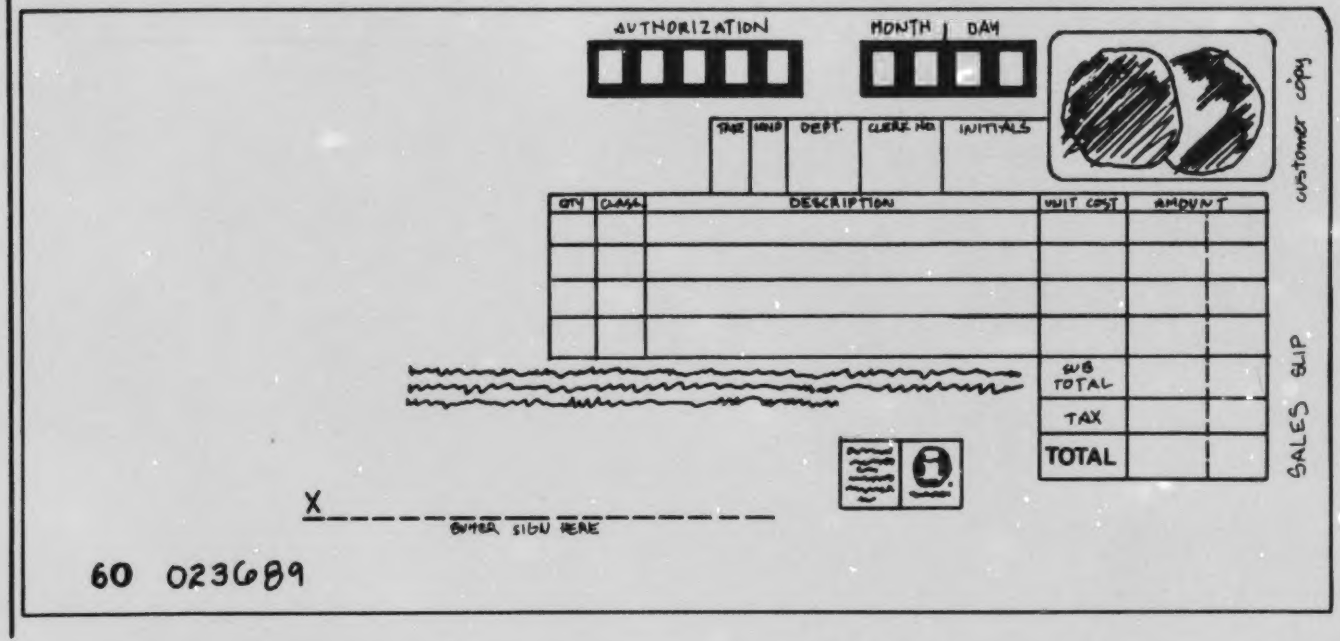
☐ CASE ☐ CHARGE ☐ MDSE. RET'D

☐ C.O.D. ☐ PAID OUT ☐ PD. ON ACCT.

QUAN.	DESCRIPTION	AMOUNT	
		total	

received by

SAMPLE CREDIT CARD RECEIPT



AUTHORIZATION

MONTH | DAY

TAKE	SEND	DEPT.	CLERK NO.	INITIALS

QTY	CLASS	DESCRIPTION	UNIT COST	AMOUNT
			SUB TOTAL	
			TAX	
			TOTAL	

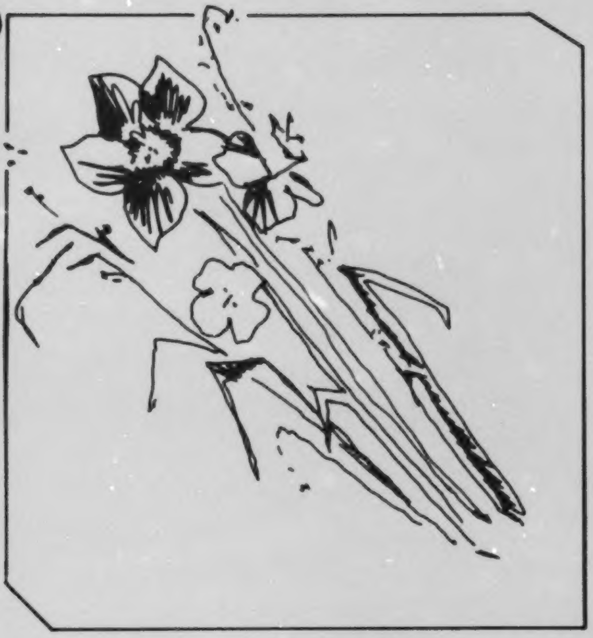
X ______________________
BUYER SIGN HERE

60 023689

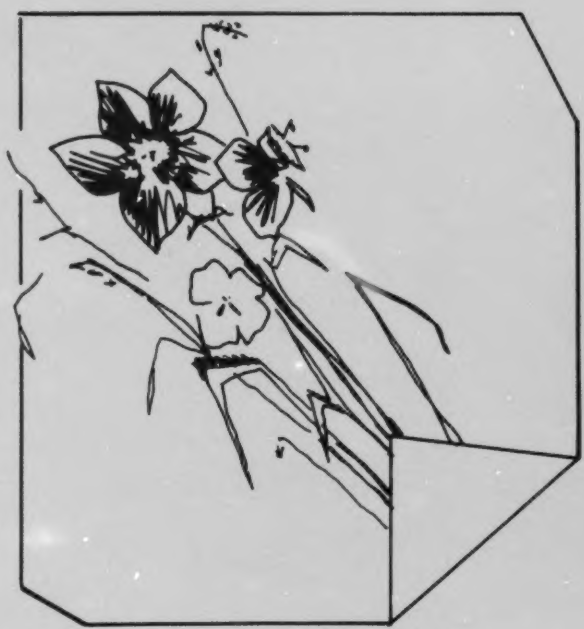
customer copy

SALES SLIP

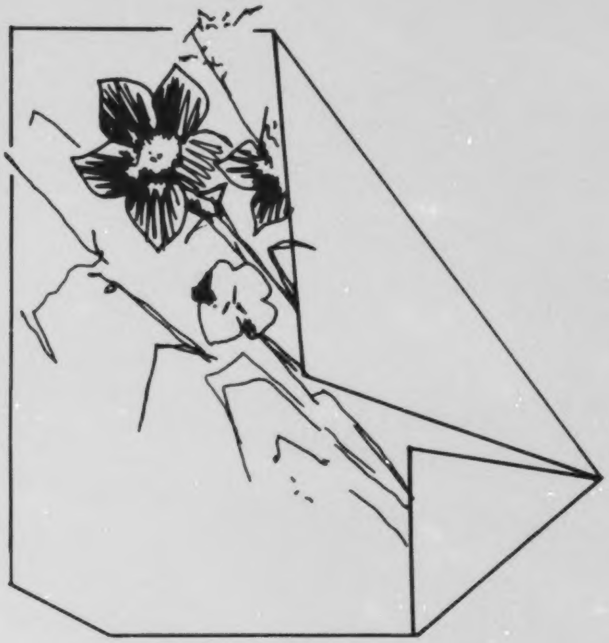
WRAPPING CUT FLOWERS



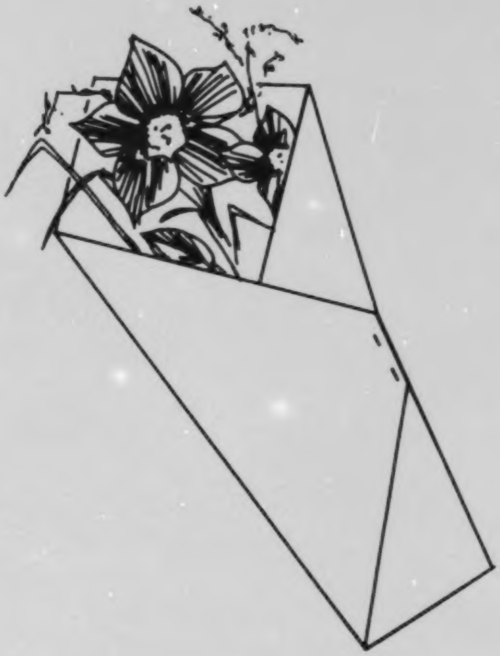
1. PLACE FLOWER STEMS TOWARD CORNER.



2. FOLD CORNER OVER STEMS.

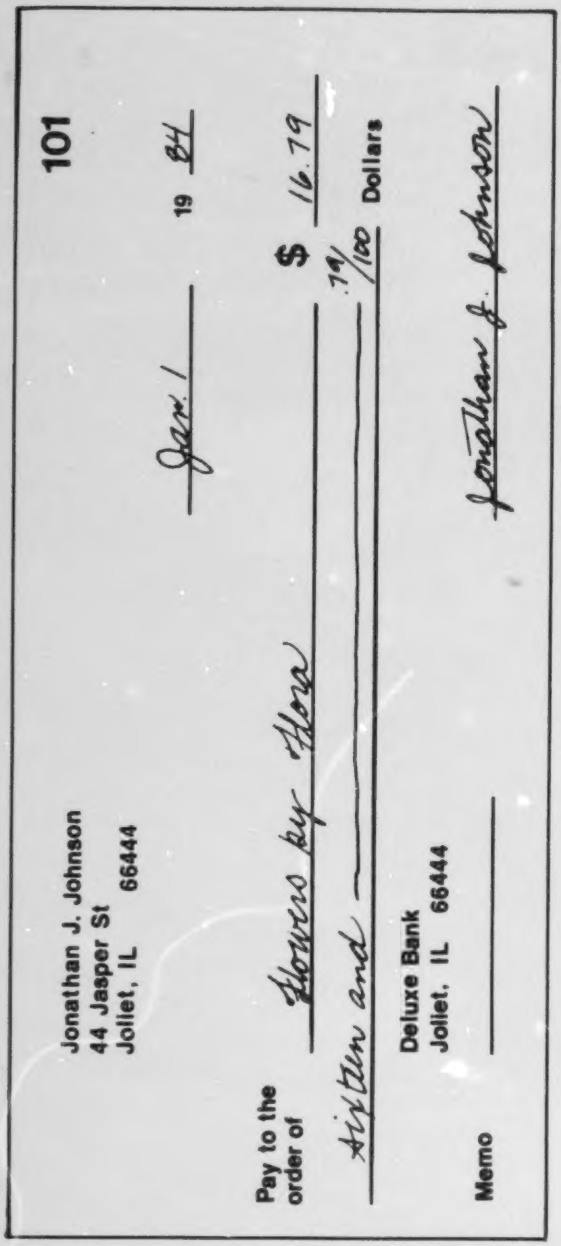


3. FOLD ONE SIDE OVER FLOWERS.



4. ROLL REST OF PAPER AROUND FLOWERS. STAPLE.

SAMPLE APPROVED CHECK



101

Jonathan J. Johnson
44 Jasper St
Joliet, IL 66444

Jan. 1 19 84

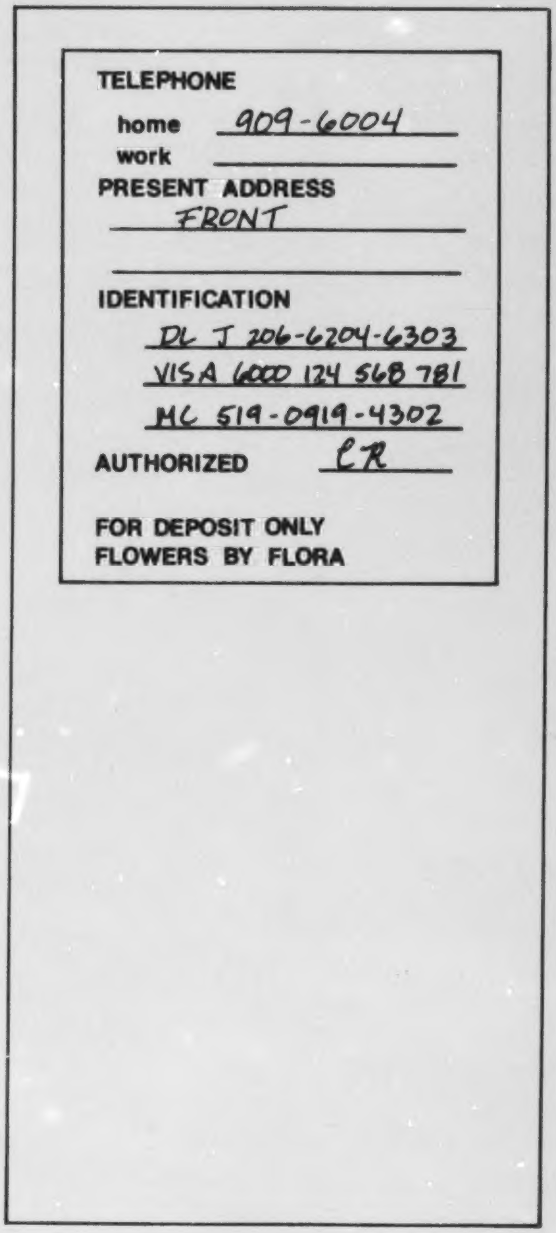
Pay to the order of Flowers by Flora $ 16.79

sixteen and 79/100 Dollars

Deluxe Bank
Joliet, IL 66444

Memo

Jonathan J. Johnson



TELEPHONE

home 909-6004

work

PRESENT ADDRESS

FRONT

IDENTIFICATION

DL J 206-6204-6303

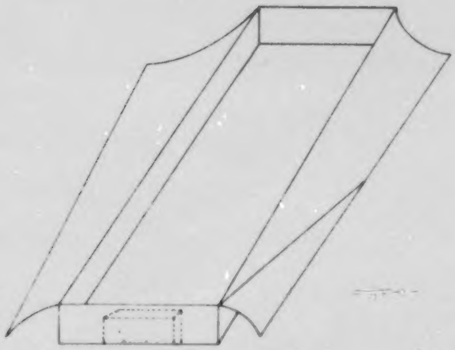
VISA 6000 124 568 781

MC 519-0919-4302

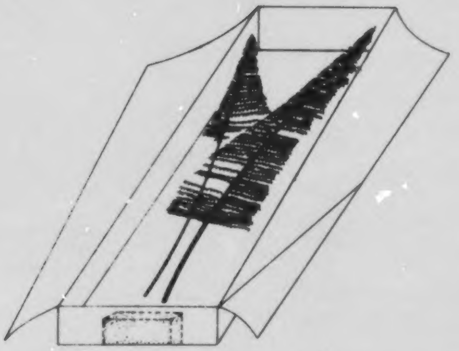
AUTHORIZED CR

FOR DEPOSIT ONLY
FLOWERS BY FLORA

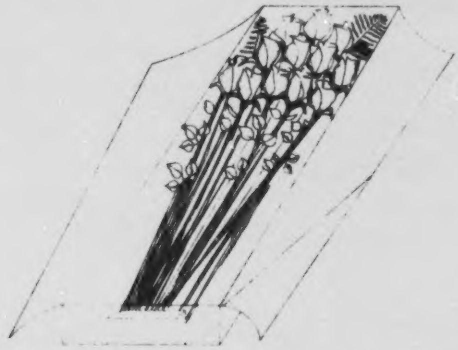
WRAPPING A BOX OF CUT FLOWERS



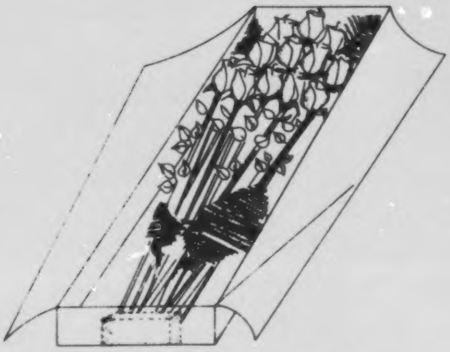
1. LINE THE BOX WITH TISSUE OR WAX PAPER. PLACE A WET BLOCK OF FOAM WRAPPED IN FOIL AT THE END OF THE BOX.



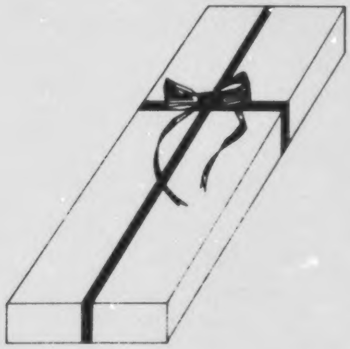
2. LAY FOLIAGE IN THE BOX WITH STEMS TOWARD THE FOAM BLOCK.



3. LAY FLOWERS ON TOP OF FOLIAGE WITH STEMS INSERTED INTO FOAM.

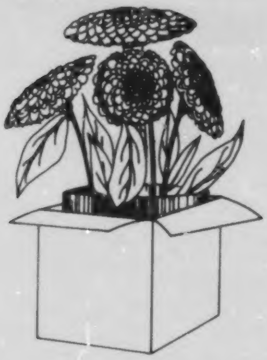


4. COVER STEMS WITH ADDITIONAL FOLIAGE.

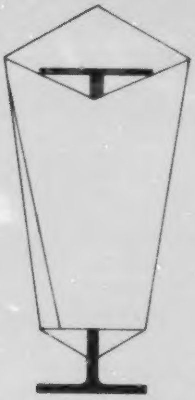


5. COVER BOX, TIE WITH RIBBON, AND ATTACH CARD.

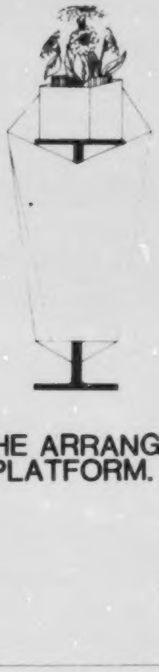
WRAPPING FLORAL ARRANGEMENTS OR PLANTS



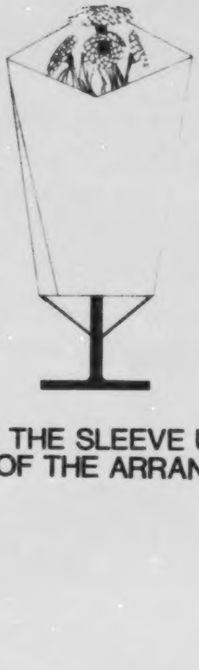
1. PLACE THE ARRANGEMENT IN BOX LINED WITH TISSUE.



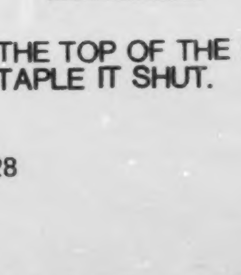
2. SLEEVE PLATFORM



3. PLACE THE ARRANGEMENT ON A SLEEVE PLATFORM.



4. PULL THE SLEEVE UP AND OVER THE TOP OF THE ARRANGEMENT.



5. FOLD THE TOP OF THE SLEEVE OVER AND STAPLE IT SHUT.

TRANSPARENCY DISCUSSION GUIDE

SELLING HORTICULTURAL PRODUCTS

I. Transparency -- SAMPLE SALES RECEIPT

A. Some types of purchases require a written receipt as well as a printed cash register receipt.

B. Receipt forms vary, but all must include the customer's name, address, and signature, date, method of payment, quantity, description, and price of merchandise, total sale, and salesperson's initials.

II. Transparency -- SAMPLE CREDIT CARD RECEIPT

A. When filling out a credit card receipt it is important to remember to check the expiration date on the credit card, imprint the credit card on the receipt, and get the customer's signature. If this information is not collected, the store loses money.

III. Transparency -- SAMPLE APPROVED CHECK

A. When accepting a check from a customer, make sure the correct date, amount, and signature are on the check.

B. It is also important to obtain the customer's driver's license number and 2 credit card numbers. Many stores use a stamp to record this information on the back of the check.

IV. Transparency -- WRAPPING CUT FLOWERS

A. Use tissue or wax paper to wrap the flowers. Some florists like to use 2 layers of paper, with a heavier, decorative paper on the outside.

B. After rolling the paper around the flowers and stapling it, some florists fold the top corner down to cover the flowers.

V. Transparency -- WRAPPING CUT FLOWERS IN A BOX

A. Be sure to choose the right size box for the number of flowers being wrapped. An oversized box will make the flowers look skimpy. An undersized box will cramp and possibly damage the flowers.

B. If the flower box is plain white, the salesperson may also want to wrap the box in gift paper before attaching the ribbon.

VI. Transparency -- WRAPPING FLORAL ARRANGEMENTS OR PLANTS

A. Plants and dish gardens may be wrapped using the identical method shown for flower arrangements. Plants in plain clay or plastic pots should have foil wrapped around the base before being put in a sleeve.

B. Although paper sleeves are most common, plastic types are beginning to gain popularity.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

SELLING HORTICULTURAL PRODUCTS

SHORT ANSWER:

1. List 4 personality characteristics of a good salesperson and explain the effect each characteristic has on the customer.

   a. Sincerity - gives the customer confidence in the salesperson.

   b. Friendliness - makes the customer feel at ease and welcome in the store.

   c. Courtesy - makes a good impression on the customer.

   d. Interest - portrays a positive image for the store.

2. List, in order, the 5 steps involved in selling a product to a customer.

   a. Greet the customer.

   b. Identify the customer's needs.

   c. Give the customer information about the product.

   d. Explain and demonstrate the product to the customer.

   e. Close the sale.

3. List 3 Do's and 3 Don'ts of good salesmanship.

DO:	DON'T:
a. find out the customer's name and remember it.	a. keep the customer waiting unnecessarily.
b. sell benefits and quality rather than price.	b. argue with or contradict the customer.
c. know your products and be able to provide information about them.	c. beg the customer to buy.

4. What information does a salesperson need to write on the back of a customer check?

   The customer's address and telephone number (unless printed on the front of the check), the customer's driver's license number, 2 credit cards or other identification numbers, and the salesperson's initials.

5. A customer buys two packs of petunias for $.72, a Boston fern for $15.00, and two bags of potting soil for $2.49. Tax on these items is $1.29. The customer gives you a twenty and a ten dollar bill. What is the customer's change (in pennies, nickels, dimes, etc.)?

   4 pennies, 1 quarter, 2 one dollar bills, 1 five dollar bill.

6. List 5 telephone manners every salesperson should use.

   a. Answer the phone as quickly as possible; try not to let it ring more than twice.

   b. Describe merchandise so that the customer can visualize it.

   c. If you must leave the phone, excuse yourself and put the customer on hold.

   d. Make several suggestions to help the customer decide.

   e. Let the customer be the first to hang up the phone.

7. Explain how a delivery routing sheet is planned.

   Group the delivery orders going to the same area. Pinpoint each delivery location on a map. Determine the most logical and time efficient sequence of delivery. Write the route on a delivery sheet.

TRUE OR FALSE:

False 1. If the customer isn't home, the delivery should be left near the front door.

False 2. Upselling means getting the customer to spend $12 on a $10 product.

True 3. Floral arrangements and plants are wrapped in sleeves.

True 4. If the customer speaks loudly and at a fast rate on the telephone, the salesperson should try to do the same.

False 5. When making change, always put the customer's money into the cash drawer first.

False 6. Most manual cash registers will compute the sales tax by themselves.

False 7. If the price of a product is high, the salesperson should apologize to the customer.

True 8. When demonstrating a product to a customer, always let the customer hold the product in his/her hands.

UNIT N: HORTICULTURE BUSINESS MANAGEMENT

PROBLEM AREA: MARKETING HORTICULTURAL PRODUCTS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. The recommended time for teaching this problem area is in conjunction with other problem areas in horticulture business management.

The estimated instructional time for this problem area is 5 to 7 days depending on how far the teacher wishes to go in developing marketing skills. If the students are to be involved in other activity exercises, the instructional time will need to be increased.

The instructor is encouraged to conduct a local search to locate other supplementary materials for use with this problem area. The items in this problem area are for reference or modification as instructors adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheets, student worksheets, laboratory exercise, transparency discussion guide, and test questions were developed by Teresa E. Paniello, Department of Vocational and Technical Education, University of Illinois, and reviewed by Janet L. Henderson, Paul E. Hemp, and Kallie S. Grobstein, Department of Vocational and Technical Education, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers

3. Using the yellow pages from a local phone book, locate the ads for horticultural businesses (i.e., garden centers, flower shops). Ask students the following leading questions:
    a. Which ads are most appealing?
    b. What kinds of information are included in the ads?
    c. Which business would you call and what influenced your decision?

V. Anticipated problems and concerns of students:

1. What is inventory?
2. How do I conduct an inventory?
3. How do I maintain inventory records?
4. What factors should I consider when pricing products?
5. How do I determine the correct markup to insure profit?
6. What is the difference between wholesale and retail prices?
7. What types of advertising can I use for horticultural products?
8. How do I distinguish between poor and effective advertising?
9. What factors should I consider when creating a store or window display?
10. What factors should I consider when purchasing horticultural products for resale?
11. How do supply and demand affect purchasing?
12. What are the steps in the marketing process from producer to consumer?

VI. Suggested learning activities and experiences:

1. Have several local horticultural business persons describe how they market their products. Have these resource persons discuss purchasing, inventorying, pricing, displaying, and advertising of horticultural products.
2. Have students create their own ads for the horticultural crops grown at school. The ads could be distributed to school students and staff members or displayed in the community.

TEACHER'S GUIDE

I. Unit: Horticulture business management

II. Problem area: Marketing horticultural products

III. Objectives: At the close of this problem area, students will be able to:

1. Conduct an inventory of horticultural products.
2. Calculate the prices of specific horticultural products using the various pricing methods.
3. Define the following terms:

a.	wholesale cost	f.	overstocked
b.	operating cost	g.	understocked
c.	retail price	h.	merchandise turnover
d.	mark-up	i.	purchase order
e.	profit	j.	invoice

4. List and describe the general purposes and types of advertising.
5. Create a store or window display for horticultural products.
6. Describe the supply and demand principles of purchasing horticultural products.
7. Describe the marketing process from producer to consumer.

IV. Suggested interest approaches:

1. Conduct a study trip to a wholesale and/or retail horticulture business and discuss the different aspects of marketing horticultural products.
2. Have a horticultural product (i.e., flower arrangement, bag of fertilizer) displayed. Ask students the following lead questions:
   - a. How much do you think this product costs?
   - b. How was the price determined?
   - c. What factors must be considered when pricing horticultural products?

3. In conjunction with a local horticultural business, have students conduct an inventory. The students should use the forms available at the business. Discuss the importance of securing accurate records.

4. Instruct students to observe store and window displays at various horticultural businesses. Have students evaluate the displays using the form on Student Worksheet 3.

5. Conduct an inventory of horticultural products in the school horticulture department. Use the sample inventory form from the transparencies in this unit as a guide.

6. Have students create a simulated store or window display in the horticulture classroom or laboratory using Laboratory Exercise 1. Students should be responsible for planning, maintaining, and changing the display according to seasons and holidays. Each display should be evaluated jointly by the instructor and students using Student Worksheet 3.

7. Have students practice pricing products according to various strategies using Student Worksheet 1. Students will need to study Information Sheet 2 - Pricing Strategies and Procedures, before attempting the worksheet.

8. Conduct a study trip to a local wholesaler and/or producer to help illustrate the marketing process from producer to consumer and to introduce students to additional horticultural career options.

9. Have students contact a local horticultural business and trace the marketing process of a specific product or group of merchandise from the original producer to the consumer.

10. Using various wholesale catalogs, have students select and order supplies needed for the horticulture classroom/laboratory or for special student projects. Students should be required to check the inventory on hand before completing their purchase orders.

11. Have students determine the retail prices to be charged for the various crops/products they sell. Information Sheet 2 and Student Worksheet 1 will help students complete this activity.

12. After discussing the various types of advertising listed on Information Sheet 3, have students identify and evaluate four different types of advertisements being used by local horticultural businesses. Student Worksheet 2 may be used as an effective evaluation tool.

13. Have students design an advertisement (radio, television, newspaper, etc.) for a real or fictitious horticultural product. Each student should present his/her advertisement to the class and allow the instructor and classmates to evaluate the ad using the criteria on Student Worksheet 2.

14. Invite a local advertising agent to class and have him/her explain the general types and principles of advertising. The advertising agent also may be helpful in evaluating the advertisements used by the horticulture students for promoting their crops and products.

15. After studying the major aspects of marketing horticultural products, allow students to review for the exam by completing Student Worksheet 4 - Marketing Crossword Puzzle. The puzzle also may be used as a transparency for a classroom review session or as a source of extra credit points for students.

VII. Application procedures:

1. The main purpose of this problem area is to develop skills in the marketing of horticultural products. Skill level for entrance into the job market should be emphasized. On-the-job training should be encouraged.

2. Additional performance should be emphasized in an ownership type of supervised occupational experience program.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate the student worksheets.

3. Evaluate special projects completed by the students.

IX. References and aids:

1. Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, Room 254, 2120 Fyffe Road, Columbus, Ohio, 43210.

    A. The Garden Center Worker - (Agdex 951)

    B. Retail Floriculture Book 1 - (Agdex 955)

2. Berninger, Louis. Profitable Garden Center Management. Reston Publishing Company, Inc., Reston, Virginia, 1978.

3. Pfahl, Peter B. The Retail Florist Business. The Interstate Printers & Publishers, Inc., Danville, Illinois, 1983.

4. Stearns, Steve. "Prescriptions for Pricing Problems," Flowers &, September 1983, p. 60-3, 99.

5. State Board of Education. Retail Florist Teacher's Guide, Illinois Office of Education.

6. Insko, Merle. Retail Flower Shop Salesperson and Floral Designer. Vocational-Technical Consortium of States, Kentucky, 1978.

INFORMATION SHEET 1

PURCHASING, RECEIVING, AND MAINTAINING INVENTORY

An inventory for a business is made up of all the merchandise available for sale in the store. Inventory merchandise includes the merchandise on display in the store as well as merchandise kept in the stock area of the store. The inventory record of a business must be kept up to date, and include an itemized list of all inventory merchandise and the total value of that merchandise.

Inventory records serve a number of purposes to business managers:

1. Inventory records determine which merchandise has been overstocked or understocked. Overstocked merchandise is any merchandise that has been on display shelves for over 6 months or any merchandise that has been damaged. Understocked merchandise is any merchandise that sells quickly and is often in short supply.
2. Inventory records determine which merchandise is most profitable. High profit items should be reordered, low profit items may be discontinued.
3. Inventory records determine merchandise turnover. Merchandise turnover is figured according to the number of times an item sells out and is reordered during the inventory period.
4. Inventory records may be used to determine merchandise costs when pricing items.
5. Inventory records are used in making annual tax reports.
6. Inventory records provide figures showing the total merchandise investment of the business. These records are useful to the business owner or manager for financial management throughout the year.
7. Inventory records determine the amount of insurance needed to cover all of the merchandise of the business.
8. Inventory records are helpful in determining financial losses due to theft, damage, or other causes.

Purchasing Inventory

Inventory merchandise is purchased according to product supply and demand. When the demand for a product is high, it is wise to keep an abundant supply of that product in inventory. When the demand for a product is low, it may be best to sell the entire inventory of that product before ordering any more. Supply and demand also affect the price of merchandise. When supply is high and demand is low, the price of the merchandise will often be lowered to try to sell more and reduce the large supply. When demand is high but supply is low, prices can be raised considerably and still sell because there are many customers who want to buy the small amount of merchandise available. A good business person remains aware of the constantly changing supply and demand of his/her products and is able to keep a balanced inventory year round. Past inventory and sales records are helpful in determining the expected customer demand and supply needed for a particular product.

There are a number of factors to be considered before inventory is purchased from any particular seller. A wise buyer knows:

1. about the product and can recognize good quality.
2. what is a fair price for the product.
3. the chances of making a profit from the product.
4. who sells the needed products.
5. where the seller is located.
6. when the seller delivers.
7. the price the seller is charging for the product.
8. the credit policy of the seller.
9. other services offered by the seller.
10. which salesperson he/she has dealt with in the past.

Receiving Inventory

When merchandise is ordered, a purchase order is filled out and sent to the seller. A purchase order contains a number of important specifications including the quantity, price, and description of items ordered, the payment terms, and the delivery arrangements and date. When the merchandise is received by the buyer, an invoice is included specifying the merchandise shipped. The invoice or original purchase order is used to check incoming merchandise according to the following steps:

1. Count each item of merchandise received.
2. Check the invoice or purchase order to be sure the types and quantities of merchandise listed are the same as those received.
3. Record the actual merchandise count next to the quantity listed on the invoice or purchase order.
4. Record any shortage or over supply of merchandise received.
5. Check for damaged merchandise, and include a description of all damages on the invoice or purchase order.
6. When all merchandise has been checked in, initial the invoice or purchase order and file it properly.

Conducting and Maintaining Inventory

Conducting an actual physical inventory requires much time and organization. Every item in the store must be counted and listed on the inventory record. Most businesses choose to conduct their inventories annually or semi-annually. Inventories also may be conducted on a monthly or daily basis. The information collected during an inventory consists of the total number of each item counted, a description of the item, and the price of the item in units. In order for accurate figures to be recorded, the inventory should be conducted in a simple step-by-step manner:

1. Separate the items to be counted according to the type and price of the merchandise.

2. Check for damaged merchandise and include only salable items in the total count.

3. Count all salable items and record the price and total number of each type of item.

4. Be sure to keep the inventories for different departments separate from each other.

5. Calculate the totals for each item, department, and the entire store.

INFORMATION SHEET 2

PRICING STRATEGIES AND PROCEDURES

Determining merchandise prices is an important part of operating any retail business. Poor pricing strategies can be responsible for the complete failure of a business. For this reason, it is vital for business managers and operators to determine the best pricing strategy for their business and to use that strategy properly and consistently.

The following are important terms frequently used in pricing merchandise:

1. wholesale cost - the amount of money the retailer paid the wholesaler for an item of merchandise.

2. operating cost - (also called overhead cost) the total cost involved in operating a daily business, including:

   a. labor
   b. rent and utilities
   c. equipment/maintenance
   d. services (delivery, credit, etc.)
   e. advertising
   f. insurance
   g. taxes
   h. interest on borrowed money
   i. outdated merchandise
   j. fluctuating wholesale prices
   k. merchandise shrinkage or damage
   l. employee salaries

3. retail price - the final cost of an item of merchandise paid by the consumer and determined according to the wholesale cost plus mark-up.

4. mark-up - the amount of money a retailer adds to the wholesale cost of an item in order to cover operating costs and insure a profit.

5. profit - the amount of money left from the proceeds of a product after all merchandise and operating costs have been paid.

An easy way to remember these definitions is:

MARK-UP = OPERATING COSTS + PROFIT

RETAIL PRICE = WHOLESALE COST + MARK-UP

Pricing Strategies

I. Follow the Leader

A simple pricing method which some retailers choose is to wait for the leading garden center or flower shop in the area to establish its prices. The retailer then establishes comparable prices of his/her own, and hopes these prices will cover all expenses. Sometimes smaller businesses wait for others to establish prices and then price their own merchandise at a considerably lower amount. In most cases, these pricing strategies are poor. By establishing prices according to another business' calculations, the retailer is risking great losses in profits and expenses. It is important to remember that all businesses are different. The operating and wholesale costs may be much higher for one business than for another. Probably the only time it is wise to follow the leader in establishing prices is after carefully considering whether those prices can cover costs and insure profits.

2. Last Year's Prices

A second pricing strategy used by some retailers is to use last year's prices as a guide to pricing this year's merchandise. Sometimes last year's prices are simply raised by a small percentage rate. Other times the retailer determines a price for an item and then checks last year's records to be sure the new price is still reasonable in comparison. Sometimes, if the wholesale and operating costs have risen only slightly from the previous year, the retailer will simply continue using last year's prices.

This strategy can become a problem for retailers that continue using the same prices year after year. Even though wholesale and operating costs may only increase slightly every year, those increases add up, and soon last year's prices can't cover this year's costs. At this point, the retailer usually makes a sharp increase in prices in order to compensate.

Customers, however, usually respond negatively to such sharp increases, and the retailer still ends up with a loss. On the other hand, customers probably would not make much of a fuss over slight price increases each year. Last year's prices are best used as a guide to annually determining new prices based on current conditions.

3. Manufacturer Suggested Price

Some types of merchandise have a pre-printed retail price listed on the package. These prices have been determined by the manufacturer of the product to offer a reasonable cost to the consumer and to insure a profit to the retailer. Most retailers adhere to the suggested retail prices of products. Some choose to lower the prices if they think it will help sell the product while still providing a profit.

4. Ratio Markup

A commonly used pricing strategy in retail horticulture businesses is pricing merchandise according to some ratio of the wholesale cost. Different types of merchandise are priced according to different ratios. Usually a 2 to 1, 2½ to 1, or 3 to 1 mark-up is used.

For example, if the wholesale cost of a hanging plant is $2.00 and the mark-up ratio is 2 to 1, then the retail price will be $4.00; if a 2½ to 1 mark-up ratio is used, then the price will be $5.00.

Although ratio mark-up prices are easy to calculate, they do not always cover the total costs. It is important to make sure the mark-up ratio being used is able to cover costs and provide profits.

5. Percent mark-up

The percent mark-up pricing strategy is probably the most effective method used. This pricing method is the best system for keeping a close watch over costs and profits. When using the percentage mark-up strategy, the retailer first calculates the retail price of an item by adding the wholesale cost, operating costs, and desired profit. For example:

wholesale cost	$3.50	
operating costs	2.50	mark-up
profit	.35	
retail price	$6.35	

Calculating the price of every item, every time the wholesale cost changed would be very time consuming using the above process. Instead, the retailer calculates a percent mark-up for an item or group of items that can be used each time prices need to be determined. The percent mark-up can be calculated as a percentage of the wholesale price or of the retail price. The following examples illustrate how each of these mark-up percentages are determined.

a. Percent mark-up based on wholesale cost:

retail price - wholesale cost = mark-up
6.35 - 3.50 = 2.85

mark-up ÷ wholesale cost x 100 = percent mark-up on wholesale cost
2.85 ÷ 3.50 x 100 = 81%

b. Percent mark-up based on retail price:

mark-up ÷ retail price x 100 = percent mark-up on retail price
2.85 ÷ 6.35 x 100 = 45%

To complete this example, suppose the next time the retailer bought this item, the wholesale cost had increased to $3.75. The retailer would then calculate the retail price by using an 81% mark-up on the wholesale cost (3.75 x .81 = $3.04 mark-up). The new retail price of the item would be $6.79.

INFORMATION SHEET 3

ADVERTISING HORTICULTURAL PRODUCTS

Advertising serves a number of purposes to retail businesses. There are a great many types of advertising, but the purposes of these ads are generally the same. Advertising is used to:

1. Sell products.
2. Get customers into the store.
3. Introduce new products to consumers.
4. Create interest in, and desire for, a product.
5. Explain the correct use of a particular product.
6. Create public awareness of a company and/or product.

Every good advertisement is able to accomplish four major goals:

1. Capture the attention of the consumer.
2. Identify a consumer need.
3. Visualize a product or service to the consumer.
4. Generate action from the consumer.

There are many different ways to advertise a product; some are used more often than others. Different situations will require different types of ads; therefore, it is important to become aware of all advertising possibilities. The following is a list of the commonly used advertising types.

newspapers
magazines
radio
television
window displays
direct mail
yellow pages
point-of-puchase-
(ads/displays near the store's cash register)

truck/bus signs
billboards
movie theaters
bumper stickers
store front signs
word-of-mouth
phone calls
cooperative ads-
(2 or more firms advertise collectively)

Advertising can be one of the greatest costs to a business. Advertising campaigns require a great deal of planning and preparation, often requiring the assistance and expertise of a trained advertising agent. An advertising campaign can be quite successful if careful considerations are made during the planning stages. These considerations include:

1. The long and short range objectives of the campaign.
2. The desired area or group the ad should reach.
3. The likelihood of receiving success/profit from the ad.
4. The age and reputation of the store.
5. The location of the store.
6. The day/month/season desired for advertising.
7. The type of advertising media desired.
8. The approximate budget allotted for the ad based on the size, type, age, scope, and location of the business, and the competition.

INFORMATION SHEET 4

DISPLAYING HORTICULTURAL PRODUCTS

Store and window displays serve four general functions similar to the functions of advertising. First, the display must attract the attention of the customer. Second, the display must stimulate the interest of the customer. Third, that interest must be transformed into a desire for the product. And fourth, the display must get the customer into the store to buy the product.

There are five distinct types of displays used in retail horticulture businesses:

1. Window displays - This is often the most important display for a store because it attracts customers off the street to come in for impulse shopping.
2. Counter, table, and shelf displays - These displays are used in the sales area of the store to make merchandise convenient and attractive to customers.
3. Manufacturer's display - This type of display is included with some items of merchandise purchased from the wholesaler. These displays are often made of cardboard and have to be constructed by the retailer.
4. Exterior display - This type of display is used most often by garden centers or landscapers. Exterior displays often attract many passers-by because the merchandise is displayed outside.
5. Salesroom cooler display - This display is used almost exclusively in retail flower shops to make fresh floral arrangements convenient and attractive to customers.

WINDOW DISPLAYS

The window display is an important part of business advertising. Passers-by spend less than 11 seconds in the process of approaching and viewing a store's window display. This quick viewing time is the reason window displays must have a strong initial impact on the viewer. A window display must be interesting and attractive in order to make an impression in such a short time.

Careful planning is necessary to create an effective window display. The following steps provide a well organized approach to creating an interesting and attractive store window:

1. Choose a theme - Every window display should revolve around a central idea or event. Seasonal themes are often used; some themes emphasize special sales or happenings in the store. Many of the same themes get used year after year. The window designer should try to be creative and innovative in choosing display themes.

2. Choose the merchandise and props - A number of materials will be needed to assemble the display, including pedestals, stands, background materials, feature merchandise, other related merchandise, accessories, signs, and show cards.

3. Make a sketch of the design plan - A sketch of the window is helpful as a guide to assembling the display. Also, ideas can be tested and easily changed while the design is still on paper.

4. Assemble the display - Display materials should not be set up randomly. The following procedure will help organize assembly:

   a. Construct the background.

   b. Set up the props and accessories.

   c. Add the feature merchandise to form the focal point.

   d. Add any other related merchandise.

   e. Place price tags and show cards near the merchandise.

   The following are several tips for creating and maintaining window displays:

* Design the display from the customer's viewpoint. Go outside and look into the window.

* Keep the display simple; elaborate details are not necessary.

* Designate a single focal point in the display, do not make the window too busy.

* Harmonize the colors within the display.

* Do not overcrowd the window with merchandise.

* Keep the display clean and neat; dust and adjust daily.

* Change the display often; do not maintain an outdated theme.

* Check perishable merchandise daily; replace merchandise when necessary.

SALES AREA DISPLAYS

The size and arrangement of display units in the sales area of a store depends on the size and type of store and the merchandise displayed. For example, a large greenhouse/garden center operation would require long benches for displaying plants in the greenhouse, and possibly a display garden center lot to display sample trees and shrubs.

The following is a list of important considerations for establishing effective merchandise displays in the sales area:

1. All displays should be attractive and organized; but at the same time, displays should not be made so immaculate that the customer is afraid to take off an item and mess up the display.
2. All displays should be checked for safety to be sure there is no hazard of merchandise falling or units being knocked over.
3. Displays and the surrounding sales area should be kept neat and clean.
4. Merchandise should always be displayed in quantity. Customers do not like to buy the last item on the shelf, so be sure to restock display units often.
5. Displays should be kept well lit. In some cases spotlights may be necessary or colored lights desired.
6. Display signs should be written legibly, with the price clearly marked.
7. Display similar or related types of merchandise together.
8. Locate displays strategically. Display impulse items near the cash register, feature items in the center of the store, and staples on the perimeter.
9. Display units should blend in with the decor of the store.
10. Always allow plenty of room between aisles and around displays to avoid congestion.

LIGHTING

Lighting can be used effectively in displays to attract attention to and help identify merchandise. Natural (outdoor) light should be utilized as much as possible. Stores with a great many windows may only require a minimal amount of artificial lighting during the day.

There are a variety of light bulb types to choose from, but probably the most popular type are cool white fluorescent bulbs. Sometimes colored lights are used in displays to achieve special effects or to enhance the visual appeal of merchandise. When using colored lighting for displays, it is important to make sure the coloring does not cause false impressions. Spotlights for window displays should always be recessed into the ceiling or wall to avoid a glare on the window.

STUDENT WORKSHEET 1

PRICING HORTICULTURAL PRODUCTS

PROCEDURE: Complete the following pricing problems using the specified pricing strategies. The following formulas will be helpful in calculating correct prices:

* MARK-UP = OPERATING COSTS + PROFIT

* RETAIL PRICE = WHOLESALE COST + MARK-UP

1. Last year you charged $1.50 for potted tomato plants. This year you plan to increase the price by 10%. How much will you charge per plant?

2. You have just received a late shipment of rose bushes for your small suburban garden center. You want to sell the bushes quickly and decide to sell them for $1.45 less than the leading garden center in town. Johnson's Nursery charges $6.25 per rose bush; how much will you charge?

3. The manufacturer's suggested retail price on a bottle of houseplant fertilizer is $3.95. You decide to reduce the price by 15%. How much will you charge per bottle of fertilizer?

4. Your flower shop is having a ribbon sale for 30% off. A customer purchases 8 yards of velvet ribbon regularly priced at 79¢ per yard, and 14 yards of satin ribbon regularly priced at 39¢ per yard. How much will you charge for the ribbon?

5. The wholesale cost of an item is $4.50. What is the retail price of the item using a 2½ to 1 mark-up?

6. You have purchased a case of 12 crystal vases from the wholesaler for $87.50. The retail price of a single vase is $14.58. What mark-up ratio was used?

7. How much is the mark-up on an item that has a wholesale cost of $5.00 and a retail price of $12.95?

8. The retail price of a bag of fertilizer is $14.95. If the operating costs equal $5.45 and profit equals $2.50, what was the wholesale cost of the fertilizer?

9. The wholesale cost of an item is $10.25. If the percent mark-up based on wholesale cost is 76%, what is the retail price of the item?

10. The retail price of an item is $29.99. If the percent mark-up based on retail price is 44%, what was the wholesale cost of the item?

11. If the retail price of a hanging basket is $8.00 and the wholesale cost was $4.35, what is the percent mark-up based on wholesale cost?

12. The wholesale cost of an item is $2.49, operating costs are $1.70, and profit is $0.31. What is the percent mark-up for this item based on:

    a. wholesale cost?

    b. retail price?

STUDENT WORKSHEET 2

EVALUATING ADVERTISEMENTS

PROCEDURE: Use the following criteria to evaluate an advertisement for a horticultural product or business.

Store or product name: ______________________________

Type of advertisement: ______________________________

Answer YES, NO, or N/A (not applicaple) to the following statements:

1. Advertisement attracts attention. ________
2. Product is clearly described. ________
3. Advertisement explains why the customer should buy the product. ________
4. Advertisement reflects the image of the business. ________
5. Advertisement contains the business' logo or distinctive format. ________
6. Advertisement is placed in a desirable location. ________
7. Advertisement is straight-forward and honest. ________
8. Advertisement is timely/seasonal. ________
9. Advertisement is not too long or too short. ________
10. Product illustrations are attractive. ________
11. Color is used effectively in the advertisement. ________
12. Advertisement has a neat appearance. ________
13. Store location is listed on the advertisement. ________
14. Store hours are listed on the advertisement. ________
15. Store telephone number is listed on the advertisement. ________

Would you buy this product or visit this business? Why or why not?

Comments:

STUDENT WORKSHEET 3

EVALUATING DISPLAYS

PROCEDURE: Use the following criteria to evaluate a store or window display of a retail horticulture business. When examining the display, be sure to look at it from a normal distance at first in order to determine the customer's first impression.

Store name: ______________________________

Type of display: ______________________________

Scoring: 1 - poor, 2 - fair, 3 - good, 4 - excellent N/A

I. Arrangement

1. Display not too empty. ____
2. Display not too full. ____
3. Main items stand out. ____
4. No clashing colors. ____

II. Cleanliness

1. Floor clean. ____
2. Background clean. ____
3. Props and fixtures clean. ____
4. Merchandise clean. ____
5. Window clean. (Window display only) ____

III. Lighting

1. Lights are hidden. ____
2. Lights are clean. ____
3. Some spotlights used. ____
4. Proper amount of lighting is used. ____

IV. Sales appeal

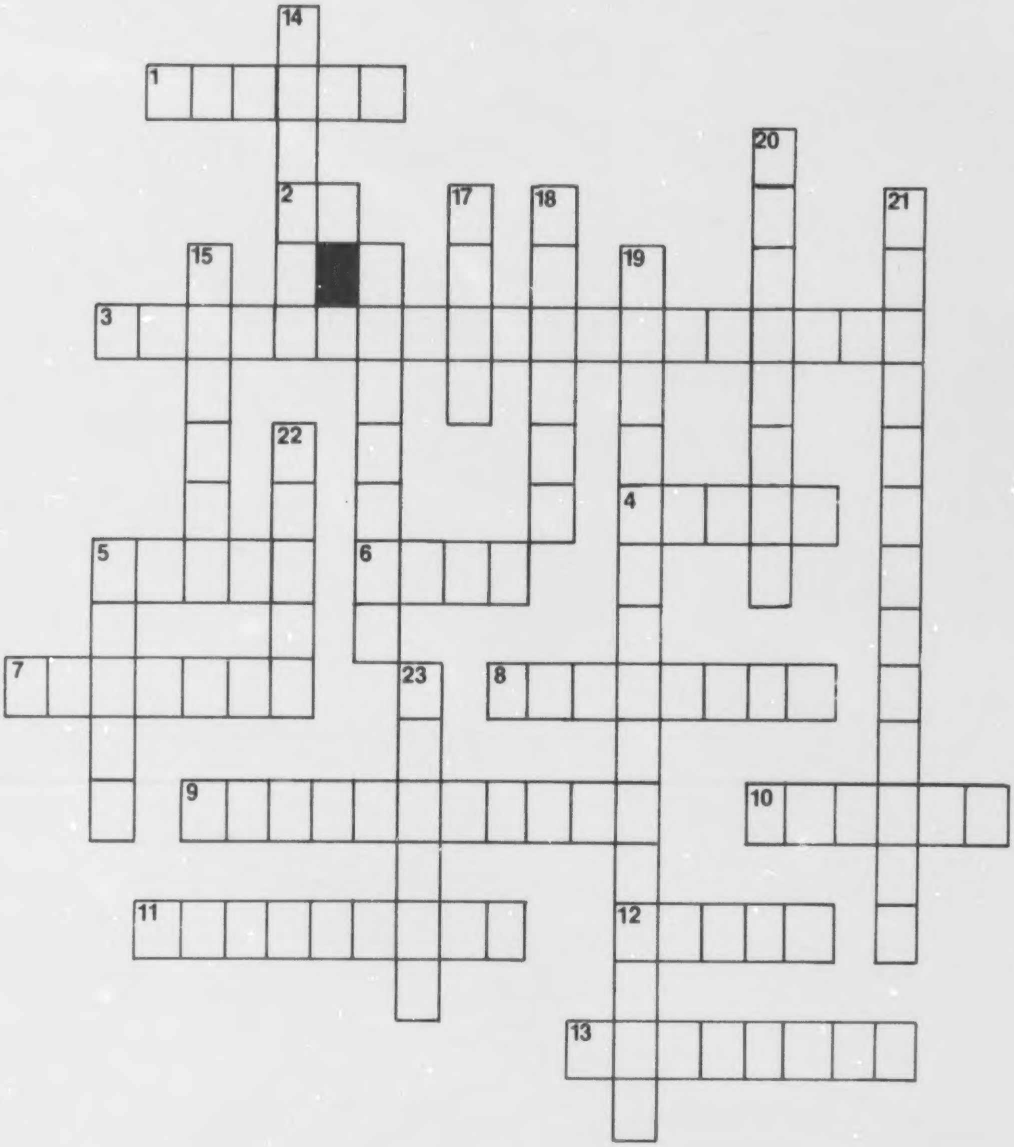
1. Display is seasonable. ____
2. Selling points are stressed. ____
3. Display cards used effectively. ____
4. Props do not overpower merchandise. ____
5. Related merchandise is used. ____

TOTAL POINTS: __________

COMMENTS:

STUDENT WORKSHEET 4

MARKETING CROSSWORD PUZZLE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STUDENT WORKSHEET 4 (CONT'D.)

MARKETING CROSSWORD PUZZLE

ACROSS:

1. Sells wholesale merchandise for the manufacturer.
2. Expensive advertising medium.
3. Number of times an item sells out and is reordered throughout the year.
4. One of the operating costs.
5. 3 to 1 mark-up
6. A good medium for personally advertising to customers.
7. When supply is high and demand is low, the retailer sometimes ________ prices.
8. First step of physical inventory.
9. Merchandise displayed for over 6 months.
10. Type of display.
11. Total merchandise available for sale.
12. Regular interval for conducting inventory.
13. Good advertising will generate this in a customer.

DOWN:

5. Advertising medium
14. Window display plan.
15. Mark-up minus operating costs.
16. Accompanies order received from wholesaler.
17. Advertising medium directed toward specific customers.
18. Number of seconds a window display holds one's attention.
19. Determines when and how much merchandise to buy.
20. Good advertising and displays will attract customers ______________ (3 words).
21. Used to request merchandise from the wholesaler.

STUDENT WORKSHEET 4 (CONT'D.)

MARKETING CROSSWORD PUZZLE

22. Help support a display.

23. Advertising should evoke this from the customer.

LABORATORY EXERCISE 1

CONSTRUCTING WINDOW DISPLAYS

PURPOSE: Students will create simulated window displays in the classroom in order to practice constructing and evaluating displays.

MATERIALS:

1. window display space
2. merchandise
3. props (stands, pedestals, etc.)
4. background material (paper, fabric, etc.)
5. accessories/related merchandise
6. signs
7. light fixtures (optional)
8. tools (if necessary)

PROCEDURES:

1. Determine the theme of the display.
2. Choose the appropriate merchandise.
3. Make a sketch of the design plan.
4. Disassemble the existing display (if necessary).
5. Clean the display area.
6. Assemble the background of the display.
7. Set up the display props using the sketched plan as a guide.
8. Add the feature merchandise at the focal point, followed by any accessories or related merchandise designated in the plan.
9. Make show cards, price tags, and/or signs and place them near the appropriate merchandise.
10. Set up any necessary light fixtures.
11. Check the display from the front view and make any necessary changes.
12. Evaluate the display.

TEACHER'S KEY

STUDENT WORKSHEET 1

PRICING HORTICULTURAL PRODUCTS

PROCEDURE: Complete the following pricing problems using the specified pricing strategies. The following formulas will be helpful in calculating correct prices:

* MARK-UP = OPERATING COSTS + PROFIT

* RETAIL PRICE = WHOLESALE COST + MARK-UP

1. Last year you charged $1.50 for potted tomato plants. This year you plan to increase the price by 10%. How much will you charge per plant?

   1.50 × .10 = .15
   1.50 + .15 = $1.65*

2. You have just received a late shipment of rose bushes for your small suburban garden center. You want to sell the bushes quickly and decide to sell them for $1.45 less than the leading garden center in town. Johnson's Nursery charges $6.25 per rose bush; how much will you charge?

   6.25 - 1.45 = $4.80*

3. The manufacturer's suggested retail price on a bottle of houseplant fertilizer is $3.95. You decide to reduce the price by 15%. How much will you charge per bottle of fertilizer?

   3.95 × .15 = .59
   3.95 - .59 = $3.36*

4. Your flower shop is having a ribbon sale for 30% off. A customer purchases 8 yards of velvet ribbon regularly priced at 79¢ per yard, and 14 yards of satin ribbon regularly priced at 39¢ per yard. How much will you charge for the ribbon?

   8 × .79 = 6.32   14 × .39 = 5.46
   6.32 + 5.46 = 11.78   11.78 × .30 = 3.53   11.78 - 3.53 = $8.25*

5. The wholesale cost of an item is $4.50. What is the retail price of the item using a 2½ to 1 mark-up?

   4.50 × 2.5 = 11.25*

6. You have purchased a case of 12 crystal vases from the wholesaler for $87.50. The retail price of a single vase is $14.58. What mark-up ratio was used?

   87.50 ÷ 12 = 7.29 per vase
   14.58 ÷ 7.29 = 2 to 1*

7. How much is the mark-up on an item that has a wholesale cost of $5.00 and a retail price of $12.95?

12.95 - 5.00 = $7.95*

8. The retail price of a bag of fertilizer is $14.95. If the operating costs equal $5.45 and profit equals $2.50, what was the wholesale cost of the fertilizer?

14.95 - 5.45 - 2.50 = $7.00*

9. The wholesale cost of an item is $10.25. If the percent mark-up based on wholesale cost is 76%, what is the retail price of the item?

10.25 × .76 = 7.79   10.25 + 7.79 = $18.04*

10. The retail price of an item is $29.99. If the percent mark-up based on retail price is 44%, what was the wholesale cost of the item?

29.99 × .44 = 13.20   29.99 - 13.20 = $16.79*

11. If the retail price of a hanging basket is $8.00 and the wholesale cost was $4.35, what is the percent mark-up based on wholesale cost?

8.00 - 4.35 = 3.65   3.65 ÷ 4.35 × 100 = 84%*

12. The wholesale cost of an item is $2.49, operating costs are $1.70, and profit is $0.31. What is the percent mark-up for this item based on:

a. wholesale cost?

1.70 + .31 = 2.01   2.01 ÷ 2.49 × 100 = 81%*

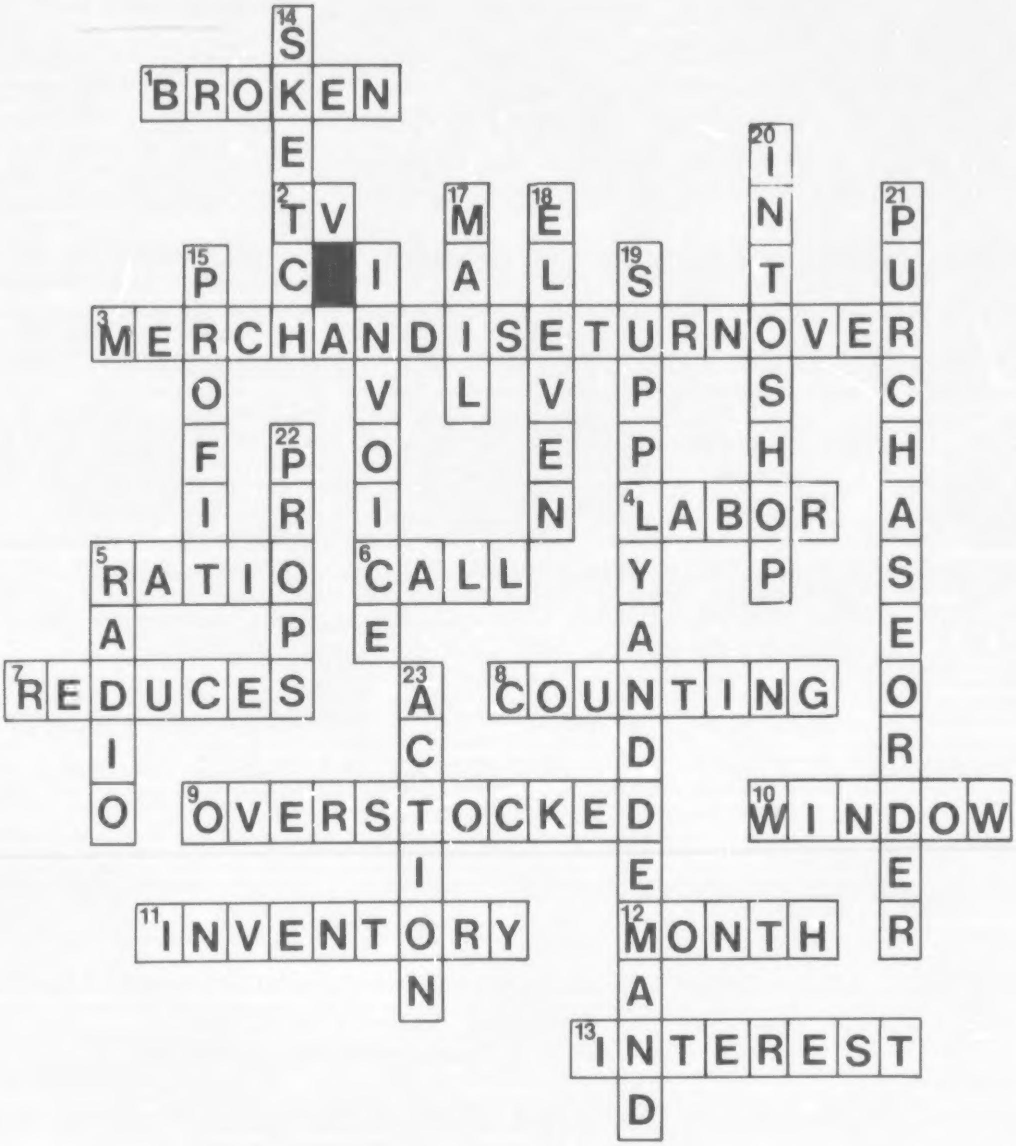
b. retail price?

1.70 + .31 = 2.01   2.01 + 2.49 = 4.50
2.01 ÷ 4.50 × 100 = 45%*

TEACHER'S KEY

STUDENT WORKSHEET 4

MARKETING CROSSWORD PUZZLE


1 BROKEN
2 TV
3 MERCHANDISE TURNOVER
4 LABOR
5 RATIO
6 CALL
7 REDUCES
8 COUNTING
9 OVERSTOCKED
10 WINDOW
11 INVENTORY
12 MONTH
13 INTEREST
14 SKETCH
15 PROFIT
INVOICE
17 MAIL
18 ELEVEN
19 SUPPLY AND DEMAND
20 INTOSHOP
21 PURCHASE ORDER
22 PROPS
23 ACTION
RADIO

SAMPLE INVENTORY FORM

M-IV-N-3-33

Inventory for month ending ________________ 19____

Actual Count Different Locations	Descriptions of Items	Unit	No. of Units	Unit Price		Amount	
60	8oz. I-Bomb Insecticide	oz.	8	4	75	285	00
			TOTAL				

SAMPLE PURCHASE ORDER

PURCHASE ORDER

TO ______________________

____

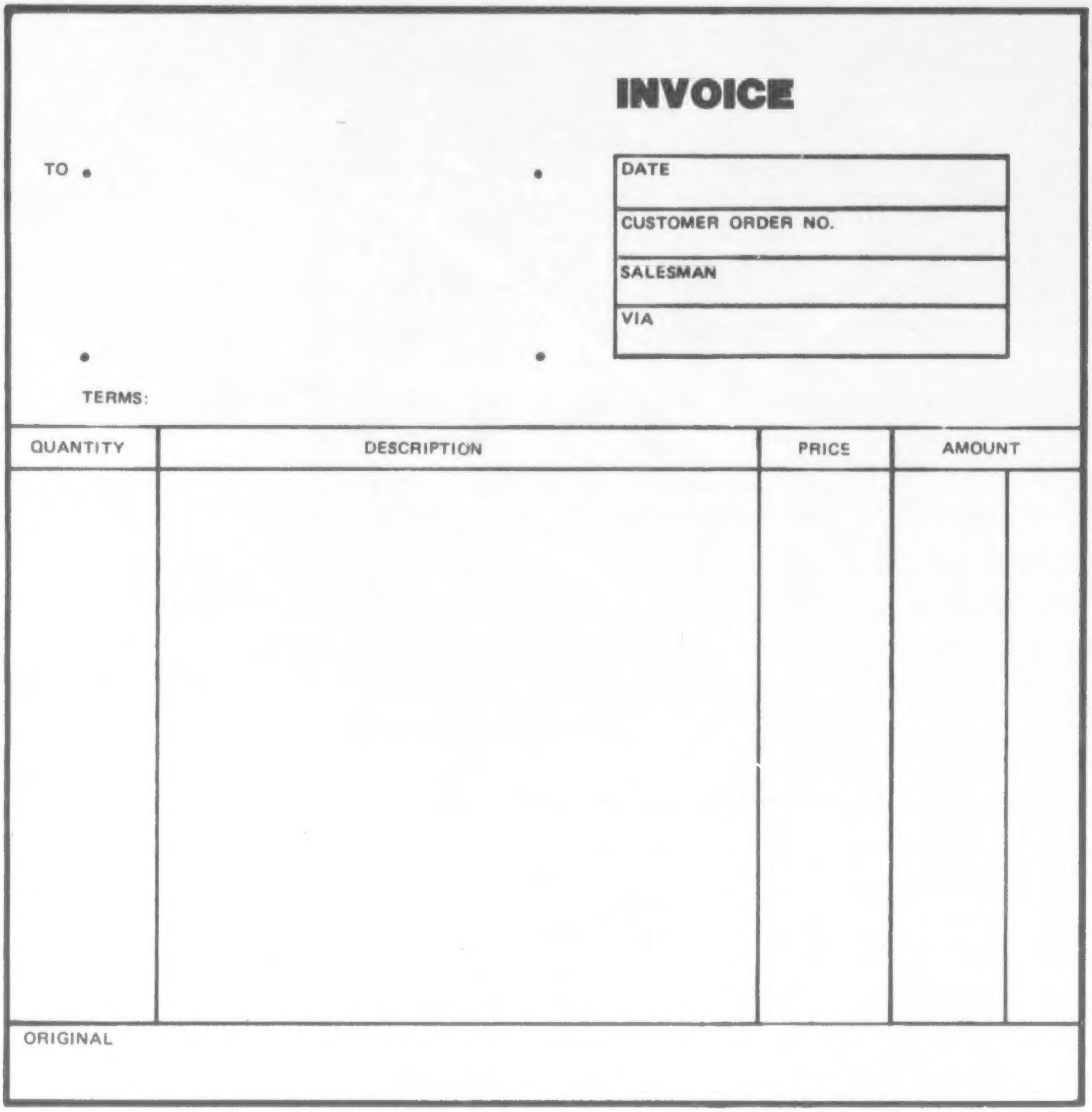
____

DATE OF ORDER	REQ. NO.
SHIP TO	

QTY. ORDERED		QTY. RECEIVED	STOCK NUMBER/DESCRIPTION	UNIT PRICE		TOTAL	
1							
2							
3							
4							
5							
6							
7							
8							

____
Authorized by

SAMPLE INVOICE



INVOICE

TO

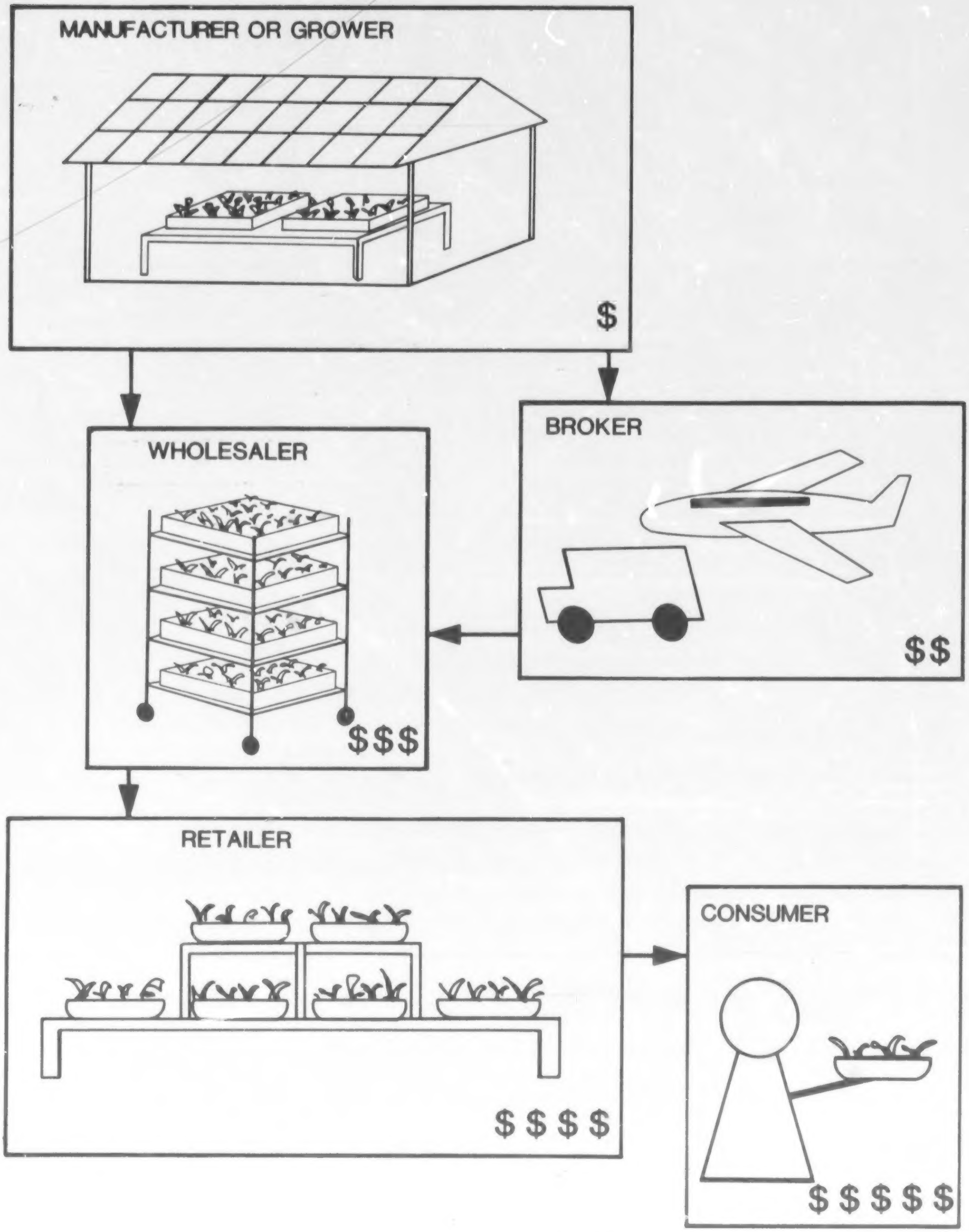
DATE	
CUSTOMER ORDER NO.	
SALESMAN	
VIA	

TERMS:

QUANTITY	DESCRIPTION	PRICE	AMOUNT

ORIGINAL

THE MARKETING PROCESS


MANUFACTURER OR GROWER
$
BROKER
$$
WHOLESALER
$$$
RETAILER
$$$$
CONSUMER
$$$$$

TRANSPARENCY DISCUSSION GUIDE

MARKETING HORTICULTURAL PRODUCTS

I. Transparency--SAMPLE INVENTORY FORM

A. Physical inventory requires counting every item of merchandise in the store and then recording these figures.

B. Inventory may be conducted on an annual, semi-annual, monthly, or daily (perpetual) basis. The more often inventory is conducted, the easier it is to keep up with.

II. Transparency--SAMPLE PURCHASE ORDER

A. A purchase order is used by the retailer to order wholesale merchandise.

B. A purchase order contains a number of important specifications including the quantity, price and description of items ordered, the payment terms, and the delivery arrangements and date.

III. Transparency--SAMPLE INVOICE

A. An invoice is sent to the retailer with the merchandise purchased from the wholesaler.

B. The invoice is used to check incoming merchandise for damage and mistakes in the order.

IV. Transparency--THE MARKETING PROCESS

A. The manufacturer or grower of horticultural products usually sells the merchandise to a wholesaler, who then sells to the retailer. Sometimes the manufacturer or grower sells directly to the retailer. And sometimes the manufacturer or grower will pay a fee or commission to a broker who is then responsible for finding buyers for the merchandise.

B. As merchandise is sold from the producer through the broker, wholesaler, retailer, and then to the consumer, the price increases in order for each business to make a profit.

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

MARKETING HORTICULTURAL PRODUCTS

SHORT ANSWER:

1. Define the following terms:

   a. mark-up - the amount of money a retailer adds to the wholesale cost of an item in order to cover operating costs and insure a profit.

   b. profit - the amount of money left from the proceeds of a product after all merchandise and operating costs have been paid.

   c. overstocked - merchandise that has remained on display shelves for over 6 months.

   d. merchandise turnover - the number of times an item sells out and has to be reordered throughout the year.

   e. invoice - an itemized list of merchandise shipped from the wholesaler.

2. Explain the proper procedure for receiving merchandise from the wholesaler.

   a. Count the merchandise and check the invoice to see that the correct items were received.

   b. Record the count on the invoice including any shortages or overages.

   c. Check for damaged merchandise and record any damages on the invoice.

   d. Initial the invoice and file it properly.

3. Design a formula to explain the relationships between wholesale cost, retail price, operating costs, and profit.

   retail price = wholesale cost + mark-up (operating costs + profit)

4. List 6 types of operating costs.

   a. labor

   b. rent

   c. advertising

   d. insurance

   e. salaries

   f. delivery

4. Explain 3 purposes of inventory records.

   a. Inventory records determine which merchandise has been overstocked or understocked.

   b. Inventory records determine merchandise turnover, which is useful in making purchasing decisions.

   c. Inventory records serve as a guide when determining merchandise prices.

5. Determine the percent mark-up for an item based on wholesale cost using the following information:

   wholesale cost = $3.00, operating costs = $1.60, profit = $.40

   mark-up = 67%

6. Determine the retail price for an item based on the following information:

   wholesale cost = $1.50, percent mark-up based on wholesale cost = 70%

   retail price = $2.55

7. Explain 4 purposes of advertising:

   a. Advertising is used to create an interest in, and desire for, a product.

   b. Advertising is used to create public awareness of a company or product.

   c. Advertising is used to get customers into the store.

   d. Advertising is used to introduce new products to consumers.

8. List the 5 main types of displays.

   a. window display

   b. counter or table-top displays

   c. manufacturer's display

   d. exterior display

   e. salesroom cooler display

UNIT N: HORTICULTURE BUSINESS MANAGEMENT

PROBLEM AREA: UTILIZING MICROCOMPUTERS IN HORTICULTURE BUSINESS MANAGEMENT

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with advanced students in vocational agriculture/horticulture programs. This problem area may be taught during the winter months when outside activities are limited.

The estimated instructional time for this problem area is 5 to 10 days. If the students are involved in computer programming activities additional classroom or laboratory time will need to be planned.

Some of the learning activities in this problem area require access to a microcomputer; other activities require previous experience with running microcomputer programs. The instructors are encouraged to modify and adapt these materials to their local situations.

CREDIT SOURCES:

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The teacher's guide, information sheet, student worksheets, and test questions were developed by Janet L. Henderson and Barbara Koch, Department of Vocational and Technical Education, University of Illinois, and reviewed by Paul E. Hemp, Kallie S. Grobstein, Teresa E. Paniello, Jerry D. Pepple, Department of Vocational and Technical Education, University of Illinois, and Bill Hunter, Vocational Agriculture Service, University of Illinois.

The artwork in this problem area was prepared by the Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Metropolitan Core Curriculum Field Test Teachers.

TEACHER'S GUIDE

I. Unit: Horticulture business management

II. Problem area: Utilizing microcomputers in horticulture business management

III. Objectives: At the close of this problem area students will be able to:

1. Define basic computer terminology.
2. Identify the basic parts and functions of a microcomputer.
3. List ways that microcomputers can be used in the horticulture industry.
4. Develop and execute a simple computer program related to a horticulture topic.
5. Evaluate computer software packages designed for horticulture programs.
6. Determine factors to consider when purchasing computer hardware.
7. Identify characteristics of microcomputer software programs.
8. Properly operate the microcomputer and appropriately handle software.

IV. Suggested interest approaches:

1. Discuss with the class how computers affect our everyday lives. Use the following lead questions:
   a. Where do we see computers or computer technology being used? (Example: grocery stores, microwave ovens, dishwashers, video games, gas stations.)
   b. How have computers affected your life?
   c. What are some advantages and disadvantages of computer technology?
2. If microcomputers are available at the school, demonstrate how to run a simple program. Discuss the capabilities of computers. Encourage students to consider how computers could be used in the horticulture program.
3. Have students keep track of the different ways microcomputers impact their daily lives. Use a short survey form to collect data during a specified time period. Have students share their findings with the rest of the class.

V. Anticipated problems and concerns of students:

1. What is a computer?
2. What are the different types of computers?
3. What are the advantages and disadvantages of using computers?
4. How do microcomputers operate?
5. How can microcomputers be used in a horticulture business?
6. What is meant by computer hardware and software?
7. How do I determine which microcomputer to purchase?
8. How can I evaluate computer software programs?
9. How should I care for a microcomputer?
10. How do microcomputer programs work?
11. Why would I want to own and/or use a microcomputer?

VI. Suggested learning activities and experiences:

1. Have students interview selected horticulture businessmen and women in the local community who use microcomputers in their operations. Use Student Worksheet 1 as a guide for planning appropriate interview questions. Upon completion of the interviews have the students share their findings with the rest of the class. Generate a list of ways microcomputers are currently being used in the local horticulture industry.

2. Invite a local horticulture businessperson to discuss how he or she use microcomputers in their daily operations. Encourage students to ask what computer skills are necessary for entry-level horticulture workers.

3. Have students review current horticulture journals for articles on microcomputers. Let students summarize and share the information with the rest of the class. Keep the articles in a notebook for future reference.

4. Develop a bulletin board using one of the following themes: computer terms, available hardware and software, uses of microcomputers, or capabilities of computers.

5. Discuss the advantages and disadvantages of using microcomputers using Transparencies 1 and 2. Encourage students to add to the lists using their own experiences.

6. Review with students the proper methods of handling floppy disks using Transparency 3.

7. Have students read sections 1, 2, and 5 in VAS Unit 6023--Introduction to Computers in Agriculture. Use Student Worksheet 2 to plan this activity. Review microcomputer terms using the worksheet as a guide for discussion.

8. Organize a study trip to a local horticulture business that uses microcomputers. Observe the different ways of utilizing computers in the business and discuss the advantages. Use Student Worksheet 1 to plan this activity.

9. Have students run a microcomputer program specifically designed for a horticulture business or class. Information Sheet 1 lists sources for purchasing ready-made programs to help in planning this activity. The instructor is encouraged to contact the sources to obtain detailed information on the horticulture programs.

10. Using VAS Unit 6023--Introduction to Computers in Agriculture, Section 3, have students develop a list of rules for storing and using microcomputers. Have students draw and display posters that illustrate the proper care for microcomputer hardware and software.

11. Have students complete Student Worksheet 4--Hardware Evaluation Checklist. Encourage students to compare and contrast the various models of microcomputers currently available. Have students evaluate and identify the best buy for their particular microcomputer needs.

12. Have students complete Student Worksheet 5--Software Evaluation Checklist. Encourage students to consider the strengths and weaknesses of various software packages. Develop a list of additional questions to ask prior to purchasing specific microcomputer programs. This activity is intended for use by students who have a basic understanding of computer terminology.

13. Have students complete Student Worksheet 3--Computer Software using VAS Unit 6025--Selecting Agricultural Computer Software. Review the information using the worksheet as a guide.

14. Have students complete Student Worksheet 6--Using the Microcomputer. This worksheet should be used with the specific microcomputer(s) available for student use.

15. Using Student Worksheet 7--Computer Programming, encourage students to become familiar with basic programming language for their specific microcomputer. How to develop a simple computer program is included in this activity.

VII. Applications procedures:

1. Familiarity with computer terminology and basic manipulative skills will be useful for all students preparing for a career in the horticulture industry.

2. A basic understanding of computers and programming can be helpful in maintaining SOE and/or entrepreneurship records for those students with access to a microcomputer.

VIII. Evaluation:

1. Prepare and administer a written exam using the sample test questions in this problem area.

2. Evaluate performance on the student worksheets.

3. Evaluate student ability to perform specific functions on the microcomputer.

IX. References and aids:

1. Vocational Agriculture Service, College of Agriculture, University of Illinois, 1401 South Maryland Drive, Urbana, Illinois, 61801 (217/333-3871).

   a. VAS Unit 6023--Introduction to Computers in Agriculture.

   b. VAS Unit 6025--Selecting Agricultural Computer Software.

   c. Microcomputer Programs in Agriculture--Greenhouse Heating and Cooling (#10) and Lawn Planning (#14).

INFORMATION SHEET 1

SOURCES OF HORTICULTURE COMPUTER PROGRAMS

1. Vocational Agriculture Service
   College of Agriculture
   University of Illinois
   1401 South Maryland Drive
   Urbana, IL 61801
   (217) 333-3871

2. Mid-American Vocational Curriculum Consortium
   1500 West Seventh Avenue
   Stillwater, OK 74074
   1-800-654-3988

3. Teaching Aids Incorporated
   Post Office Box 1798
   Costa Mesa, CA 92626-0798
   (714) 548-9321

STUDENT WORKSHEET 1

BUSINESS INTERVIEW - MICROCOMPUTERS

1. Name and address of business: ____________________

2. Nature of business: ____________________

3. Number of microcomputers: ____________________

4. Computer model(s): ____________________

5. Peripheral devices (please list): ____________________

6. Source of computer training: (Check all that apply)

____ self ____ college ____ military

____ high school ____ on-job ____ other (specify) ________

7. Uses for the microcomputer:

____ employee records (example: payroll)

____ inventory of crops and/or supplies

____ sales analysis

____ crop scheduling

____ customer records (example: billing)

____ financial planning (example: budgeting)

____ other (specify) ____________________

8. Microcomputer skills needed by entry level workers: ____________________

9. Additional Comments: ____________________

STUDENT WORKSHEET 2

MICROCOMPUTER TERMS

Reference: VAS Unit 6023 - Introduction to Computers in Agriculture, Sections 1, 2, and 5.

1. Mainframe Computers - ____

2. Minicomputers - ____

3. Microcomputers - ____

4. Computer Processing Unit - ____

5. Peripheral Devices - ____

6. Bit - ____

7. Byte - ____

8. Kilobyte (K) - ____

9. Floppy Disk - ____

10. Random Access Memory (RAM) - ____

11. Read Only Memory (ROM) - ____

12. Cathode Ray Tube - ____

13. Non-Impact Printer - ______________________

____

____

14. Impact Printer - ______________________

____

____

15. Hardware - ______________________

____

16. Software - ______________________

____

17. BASIC - ______________________

____

STUDENT WORKSHEET 3

COMPUTER SOFTWARE

Reference: VAS Unit 6025--Selecting Agricultural Computer Software.

1. List the three main types of computer software and briefly define each.

   a. ____________________

   ____

   b. ____________________

   ____

   c. ____________________

   ____

2. Briefly explain why "Z" brand computer may be unable to utilize another company's software.

   ____

   ____

3. How might the problem described in question #2 be corrected while still utilizing opposing brands?

   ____

   ____

4. List the four most common programming languages.

   a. ____________________

   b. ____________________

   c. ____________________

   d. ____________________

5. Approximately how many versions or dialects of BASIC exist?

6. If you are planning to use your microcomputer primarily to run programs rather than for developing programs, would you purchase a microcomputer with a compiler or an interpreter? Explain your answer.

7. List and briefly define the three types of application software packages.

   a.

   b.

   c.

8. List eight things you should check when evaluating commercial software packages.

   a.

   b.

   c.

   d.

   e.

   f.

   g.

   h.

9. Describe the following general commercial programs available for use as agricultural software.

   a. Data Base Management programs-

   b. Word Processing programs-

   c. Spread Sheet programs-

   d. Graphic program-

10. How might the four general commercial programs discussed in question #9 be used to help you keep records on your SOEP?____________________

11. Compare the advantages and disadvantages in using commercial, custom, or user-written software.____________________

12. Where might you obtain information about available software?

STUDENT WORKSHEET 4

HARDWARE EVALUATION CHECKLIST

I. Procedures: Visit a local microcomputer dealer or use available dealer catalogs to complete the following hardware checklist. Circle the appropriate letter in the right-hand column.

Brand Name: ______________________ Model: ______________

Price: ______________

A. Keyboard/Disk Drive/Memory	Yes	No	Not Applicable
1. Sold by a local dealer who provides service.	Y	N	NA
2. Is a name brand computer that has software available.	Y	N	NA
3. Has sufficient memory (at least 64-128K).	Y	N	NA
4. Additional memory capacity can be added if needed.	Y	N	NA
5. Uses a 5¼-inch diskette.	Y	N	NA
6. Can be connected to a phone modem to access other computers.	Y	N	NA
7. Additional disk drives can be added if needed.	Y	N	NA
8. Has adequate graphics capabilities.	Y	N	NA
9. Keyboard keys are clearly marked and easy to operate.	Y	N	NA
10. Will operate a color monitor.	Y	N	NA
11. Price is comparable to similar brands.	Y	N	NA
B. Monitor/Printer			
1. The picture is sharp and clear.	Y	N	NA
2. Monitor has a color screen.	Y	N	NA

	Yes	No	Not Applicable
3. Has desired speed of print. (Dot matrix or Daisy wheel)	Y	N	NA
4. Printer provides graphics capabilities.	Y	N	NA
5. Printer provides letter quality type.	Y	N	NA

II. Procedures: Answer the following questions after completing Part I of the checklist.

1. What do you want to do with the computer? List your goals.

2. Is there a less expensive way to do what you want? Explain.

3. How will repairs and questions about the equipment be handled? Explain.

4. Do you have adequate space and power sources to operate the microcomputer? Explain.

5. Would you purchase the hardware just evaluated? Why or why not?

____

____

____

____

____

____

STUDENT WORKSHEET 5

SOFTWARE EVALUATON CHECKLIST

I. Procedures: Visit a local microcomputer dealer or use a program available at school to complete the following software checklist. Circle the appropriate letter in the right-hand column.

Name of Program: ______________________________ Price: __________

Nature of Program: ____

A. General	Yes	No	Not Applicable
1. The program provides the desired output.	Y	N	NA
2. Sold by a dealer or company that provides service.	Y	N	NA
3. Software will operate on desired hardware.	Y	N	NA
4. Software does not require more memory (K) than the hardware has.	Y	N	NA
5. Price is comparable to similar programs.	Y	N	NA
6. The program is free from errors.	Y	N	NA
7. The program can be modified.	Y	N	NA
B. Input			
1. Cursor or other indicator shows where input is to go.	Y	N	NA
2. Input can be corrected if necessary before program continues.	Y	N	NA
3. Error diagnostics are given when improper data is inputted.	Y	N	NA

		Yes	No	Not Applicable
C.	Output			
	1. The output is in an easy-to-read and understand format.	Y	N	NA
	2. Produces output on a printer if desired.	Y	N	NA
	3. Program is in color for color monitors.	Y	N	NA
D.	Instructions			
	1. Documentation is provided in the software package.	Y	N	NA
	2. User can skip instructions and return to them when needed.	Y	N	NA
	3. The text is clear and easy to read.	Y	N	NA
	4. Commands are written in simple-to-understand terms.	Y	N	NA
	5. Uniform terms are used throughout the program.	Y	N	NA
	6. Clear graphics can be used when needed.	Y	N	NA
	7. Sound and/or music is used effectively.	Y	N	NA
E.	Documentation			
	1. Provides easy-to-read, step-by-step instructions.	Y	N	NA
	2. Contains a sample set of data with output to test the program.	Y	N	NA
	3. Contains a tutorial.	Y	N	NA
	4. Provides a list of program's commands.	Y	N	NA

II. Procedures: Answer the following questions after running a sample software package.

1. Were there times when you felt explanations were unclear? Explain.

2. Were there times when you felt frustrated using the program? Explain.

3. Were there times when you lost interest in the program? Explain.

4. What features of the program did you most like or enjoy?

5. What features of the program did you least like or enjoy?

6. How could you use this program in your supervised occupation experience program?

STUDENT WORKSHEET 6

USING THE MICROCOMPUTER

Computer manufacturers design their computers to respond to a unique set of instructions. It is essential for the user to become familiar with the particular commands and procedures for operating the model of microcomputer being utilized.

Procedures: Complete the following student worksheet with the assistance of your instructor and your microcomputer operating manual.

1. Identify the brand and model of your microcomputer. ____________

   ____

2. Identify the major components of the microcomputer. ____________

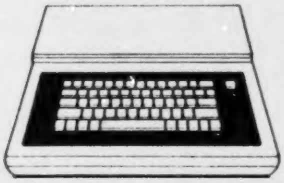
   ____

   ____

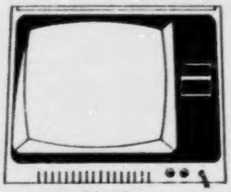
   ____

   ____

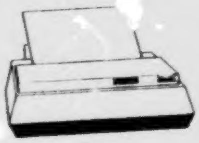
   Compare and contrast your model to the diagram.



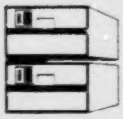
Microcomputer with Keyboard



Monitor



Printer



Disk Drives

3. Locate the power switch(es) on your computer. Place an X in the diagram in question #2 to indicate the power switch(es) location. Briefly describe if necessary. ____________

   ____

   ____

4. Turn the power switch(es) to "ON" for the necessary components.

5. List in the space below any additional sign-on instructions needed for your computer, numbering each step. ____________

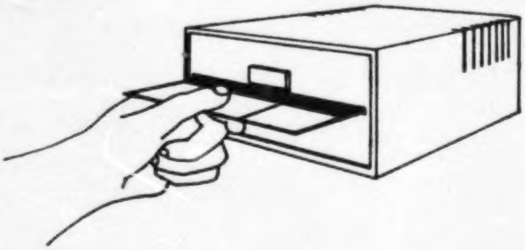
   ____

   ____

6. Check that the disk drive "in use" light is OFF before proceeding.

7. Determine which disk drive will be utilized when only one diskette is used and two disk drives are available. Identify in the space provided.

8. Placing fingers on the diskette jacket (label) only, gently remove the diskette from its protective envelope. Hold your right thumb over the label: this will normally insure the correct orientation when you place the diskette on the drive.



9. Carefully, with the label facing up, place the diskette into the open disk drive. The edge of the diskette with the oval cut out in the diskette's square plastic cover should enter the drive first. The edge of the diskette with the label enters the drive last.

10. Slowly and gently close the disk drive door. Closing the door lowers the drive head onto the disk. Care should be taken to avoid damage to the disk and the drive head.

11. List additional directions needed to load the diskette's catalogue onto the workspace and screen. The catalogue is a list of programs stored on the diskette. It may also be referred to as a "Menu".

12. Record the steps necessary to execute a program listed in the catalogue.

13. Once you have begun a program, how can you return to the catalogue?

14. List the steps necessary to change diskettes. Caution: NEVER remove a diskette when the "in use" light is on the disk drive.

15. List the steps for printing a program.

16. How can you correct an error in typing?

17. What is a "syntax error" and what should you do if this appears on the screen?

18. List the steps for signing-off of your computer. Caution: NEVER remove a diskette when the "in use" light is on.

19. Carefully store the diskette in a protective envelope in an appropriate location free from dust, temperature extremes, and exposure to magnetic fields. Never place the diskette on top of the microcomputer or its peripherals.

STUDENT WORKSHEET 7

COMPUTER PROGRAMMING

A computer program is a list of detailed instructions given by the programmer to the computer which describes a process to be performed. The program is written in a computer language specific to the computer model being used. Many personal microcomputers utilize a language called BASIC (Beginners All-purpose Symbolic Instruction Code) which allows the programmer to communicate with the computer. Although many computers utilize BASIC, there are many variations (dialects) of BASIC used by different manufacturers; therefore, the system commands will vary. The system commands for your computer can be found in the operator's manual.

Procedures: With the assistance of your instructor, complete the following worksheet on your microcomputer, utilizing the operator's manual when necessary List instructions and fill in the blanks as you proceed.

1. Sign on the computer.

   Instructions: ______________________________

   ____

   ____

2. When the computer is ready it will show a welcome or ready message on the screen and the "in-use" light will be off on the disk drive.

3. Type:

   *

   ```
   100  REM   This is a discovery program for horticulture students.
              Barb Koch.  February 26, 1985.
   ```

   *

   What you have typed in step #3 is called a program line. Each line has a line number. What is the line number used in step #3? ____________ The line number is used by the computer to order each line in the program.

4. After typing a program line onto the screen always check it for accuracy. Remember you can correct errors utilizing the appropriate arrow (<, >) key.

5. Once the line has been typed and edited it must be <u>entered</u> into the computer's workspace.

* *

To enter a program line press the RETURN bar.

* *

Now enter line 100.

6. Type the following program lines being sure to enter each line separately. Be certain to copy each line exactly and to edit each line for errors <u>before</u> entering each line.

```
110  LET    A = 2
120  LET    B = 1
130  LET    C = A * B
140  PRINT  C
150  END
```

* *

7. To get a clear display of the program lines you have entered in the workspace type: LIST--then press RETURN to enter the system command.

* *

8. If steps 1-7 are correctly completed, the following should be printed on the viewing screen:

```
100  REM    This is a discover program for horticulture students.
            Barb Koch.  February 26, 1985
110  LET    A = 2
120  LET    B = 1
130  LET    C = A * B
140  PRINT  C
150  END
```

9. Re-check the program lines for errors. If an error appears in any line simply retype and enter the appropriate line number.

10. The program lines comprise a program. By reading the statements after each line number, determine what the program will have the computer do. Write your prediction on the line below.

* *

11. To execute the program in the workspace type: RUN and press RETURN.

* *

12. What happened? ____

____

13. Type and enter:

* *

```
     100  LET  A = 56
```

* *

14. Display the program in the workspace. (Refer to Step #7.)

15. If you execute the program now, what do you think will happen?

____

____

16. Execute the program. (Refer to Step #11.) What happened?

____

____

17. Type and enter:

* *

```
     100
```

* *

18. Again display the program in the workspace. (Refer to Step #7.)

19. What has happened to line 100?

____

____

20. By entering a line number only you can erase the corresponding line in your program.

21. Execute the program in the workspace. (Refer to Step #11.)

22. Has anything changed in the computer's output? ____________________

____

23. Line 100 was a REM statement. REM stands for "remark." A REM statement is listed in a program as a remark or reminder to the programmer. A REM statement is used to document information concerning the designer and date of a program, the purpose of a program, or to explain portions of the program. It is ignored when the computer executes the program; thus, its presence or absence makes no difference in the computer's output.

24. Refer to Step #8. What was the remark the programmer wrote on line 100?

____

____

25. Re-enter a REM statement on line 100 that includes your name and the date. Display the program to check your work.

26. Type and enter:

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
     120  INPUT  B
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

27. Display the program in the workspace. What do you think will happen now?

____

____

28. Execute the program in the workspace. What appears on the screen?

____

____

29. What line do you think is generating the question mark? ____________

30. The INPUT command in line 120 generates the question mark. The computer is asking the user for information, in this case a number. The INPUT command allows the user to change the problem the computer will answer. The number given by the user will be represented by the letter B in the formula.

31. Type and enter: any number.

32. What happened? ____

____

Why? ____

____

33. Re-execute the program several times. Is the number always being doubled?

34. Type and enter:

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
        115  PRINT  "How many bushels of apples will be shipped";

        140  PRINT  B; "      bushels being hauled will weigh     " ; C;
                    "     pounds "

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

35. Display the program in the workspace. What happened to the program line numbers? ____

____

36. The line numbers enable the computer to place the program lines in the correct numerical order even though they have been entered out of sequence. This allows the programmer to go back and add lines to a program as desired. By assigning numbers that are in increments of ten or more the programmer provides space for adding lines later if desired.

37. Reviewing the display, what do you predict will happen if the program is executed? ____

____

38. Execute the program and record the output.

____

____

39. Information placed inside the quotation marks following the PRINT command will be printed on the screen as is done by line 115 and line 140. The semi-colon used in line 115 after the quotation marks will cause the input question mark to appear at the end of the question. Re-execute the program to check that the question mark appears at the end of the question.

40. Retype line 115 omitting the semi colon at the end. Execute the program. What has changed? ______________________________

____

41. Display the program again. Carefully read line 140. Explain why the B and C are not included in the quotation marks.

If you are unsure, try retyping the line putting quotes around the letters B and C. What changes occurred?

____

____

42. The END statement is not necessary for all computers but some computers require its presence. Erase line 150. (Refer to step #20.) Execute the program. What happened? ____________________________

____

Is the END statement necessary for your computer? ____________

____

43. If the computer is turned off the program will be erased permanently. The only way to save the program for future use is to store it on the diskette. To store the program you will need to obtain an initialized diskette with available space from your instructor.

44. List the steps for saving or storing a program on the diskette.

____

____

____

45. Store the program on the diskette and check the diskette's catalogue to be certain it has been stored properly before continuing.

46. To begin a new program the computer's workspace must be cleared of the old program.

* *

To clear your computer's workspace type and enter: ________________

* *

47. Using the space provided, develop a program that would figure the area of a turf field that is 1742.4 ft. long and 1000 ft. wide. Use "W" to represent the field's width and "L" to represent the field's length. Start with line 100 and be sure to include a REM (remark) statement and an END statement.

48. Enter, display, and check your program.

49. Execute the program. Did it work properly? Make corrections if necessary.

50. Now change the program so that it prints the area of the field in terms of acres rather than square feet. Clue: there are 43560 sq. ft. in an acre. List the program change necessary to compute the answer into acres in the space below.

____

____

51. Implement the necessary changes. Display the program and check for errors.

52. Execute the program. What answer was printed? ____________________

53. The answer should be 40.

54. Now change the program so it will compute the acreage of any size turf field using lengths and widths entered by the program user. List the changes below.

____

____

55. After entering and checking the changes made in your program, execute the program. If the program is correct you should be able to enter 1500 and 871.2 to get an answer of 30 to appear on the screen.

56. Add lines so that an appropriate question appears prior to each input question mark. (Refer to Steps #34-41.) Write the changes in the space below.

57. Change the program so that the word "acres" follows the output answer printed on the screen.

58. Store your program on a diskette. (Refer to Step #44.)

59. Print the display of your program and its execution. (Refer to Step #15 of Student Worksheet 6.)

TEACHER'S KEY

STUDENT WORKSHEET 2

MICROCOMPUTER TERMS

Reference: VAS Unit 6023 - Introduction to Computers in Agriculture, Sections 1, 2, and 5.

1. Mainframe Computers - very large and expensive computers; introduced in the 1950s; housed in specially-designed rooms; cost over $100,000.
2. Minicomputers - smaller units than mainframe computers; introduced in the mid-1960s; range in price from $10,000 to $25,000.
3. Microcomputers - a small-size computer; operates using an electric, silicon chip; units can be mass produced; relatively low cost.
4. Computer Processing Unit - major component of a computer system; housed inside the unit that holds the keyboard; processes all data.
5. Peripheral Devices - any device connected to the computer; examples include printers, video screens, and memory storage units.
6. Bit - a single signal; smallest unit of information recognized by the computer.
7. Byte - a group of eight bits; one character equals one byte.
8. Kilobyte (K) - one thousand bytes or units of information; referred to as K of memory.
9. Floppy Disk - a magnetic disk used for memory storage; sealed in a square jacket measuring 5¼ inches; uses a disk drive to play the diskette; one disk can store between 80,000 to 500,000 bytes of information.
10. Random Access Memory (RAM) - storage units into which data can be written or read.
11. Read Only Memory (ROM) - storage areas that are permanently wired to perform one function or contain specific data.

12. Cathode Ray Tube - video monitor; referred to as CRT; television sets can be used as monitors.

13. Non-Impact Printer - inexpensive dot matrix printer; a thermal printer; uses heat sensitive paper and hot wire printing head; costs between $400 and $500; paper is expensive and will discolor and fade in heat and sunlight.

14. Impact Printer - most popular type of dot matrix printer; ranges in price from $400 to $2,000; uses regular paper and has excellent quality of type.

15. Hardware - the physical equipment in a computer system; examples include disk drives, keyboard, monitor, and printer.

16. Software - programming designed for use with a microcomputer; programs come with a manual explaining the specifics of the program.

17. BASIC - a type of computer language; stands for Beginner's All-purpose Symbolic Instruction Code.

TEACHER'S KEY

STUDENT WORKSHEET 3

COMPUTER SOFTWARE

Reference: VAS Unit 6025--Selecting Agricultural Computer Software.

1. List the three main types of computer software and briefly define each.
   a. Operating system software. Controls the basic operation of the computer and its peripherals. Translates electric impulses into a computer process or action.
   b. Programming language software. Provides a language for people to communicate more easily with code-operated computers.
   c. Application software. Computer programs purchased by the user to perform particular functions.
2. Briefly explain why "Z" brand computer may be unable to utilize another company's software.

   The operating system is not compatible with the programming language used in developing the application software, making it impossible for the computer to decode the software being used.
3. How might the problem described in question #2 be corrected while still utilizing opposing brands?

   A translator system could be added that would decode one language into another. The use of a standardized microcomputer operating system, CP/M (Control Program for Microcomputers), could eliminate the problem.
4. List the four most common programming languages used.
   a. Fortran
   b. Cobol
   c. Pascal
   d. Basic

5. Approximately how many versions or dialects of BASIC exist? 125

6. If you are planning to use your microcomputer primarily to run programs rather than for developing programs, would you purchase a microcomputer with a compiler or an interpreter? Explain your answer.

   A compiler. It is much faster when using programs, although it is quicker to debug a program by using an interpreter.

7. List and briefly define the three types of application software packages.

   a. Canned or commercial software. Ready-made programs.

   b. Custom software programs written from scratch by a professional programmer for a specific purpose.

   c. User-written software. Software packages developed by a manager for use in a business.

8. List eight things you should check when evaluating commercial software packages.

   a. Use it for an extended period of time.

   b. Examine the program documentation.

   c. Examine user documentation.

   d. Check for hardware-software compatibility.

   e. Utilize sample problems to check program accuracy.

   f. Check for technical information accuracy.

   g. Determine who will provide necessary support for the program.

   h. Determine how program updating can be accomplished.

9. Describe the following general commercial programs available for use as agricultural software.

   a. Data Base Management programs - Used to store and process raw data. Considered an electronic file cabinet.

   b. Word Processing programs - Composes letters and documents on the computer.

   c. Spread Sheet programs - Used to do mathematical manipulations of numbers. An electronic scratch pad.

d. Graphic program. A program that will plot bar, line, and scatter graphs.

10. How might the four general commercial programs discussed in question #9 be used to help you keep records on your S.O.E.P.? ______________

Answers will vary.

____

____

____

11. Compare the advantages and disadvantages in utilizing commercial, custom, or user-written software. Commercial programs are easy to obtain, but are not specific for individual use. Custom programs are more costly than commercial programs. User-written programs are very specific for individual use, but are time consuming to develop.

12. Where might you obtain information about available software?

Computer dealers and companies, state universities, computer magazines, cooperative extension service, community colleges, agricultural companies and financial institutions.

TEACHER'S KEY

STUDENT WORKSHEET 7

COMPUTER PROGRAMMING

3. 100

19. It has been erased.

22. No

24. REM. This is a discovery program for horticulture students. Barb Koch. Feb. 26, 1985.

35. The program lines were placed in correct numerical order.

40. The question mark appears on the line <u>below</u> the question.

41. The B and C represent inputs that vary. If placed inside the quotation marks the letters are printed in the output rather than the variables that they represent.

47.

```
100  REM     (an appropriate statement including name and date)
110  LET     L = 1742.4
120  LET     W = 1000
130  LET     A = A * W
140  PRINT   A
150  END
```

50.

```
130  LET  A = L * W / 43560
```

54.

```
110  INPUT  L
120  INPUT  W
```

56.

```
105  PRINT  "What is the length of the field";
115  PRINT  "What is the width of the field";
```

57.

```
140  PRINT  A; "      acres"
```

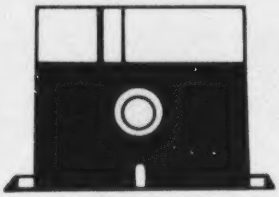
Advantages of Microcomputers

1. Microcomputers can do routine tasks faster than humans
2. Microcomputers make fewer mistakes than humans
3. Microcomputers can play games
4. More work can be produced for less money by a properly-used microcomputer
5. Microcomputers can efficiently handle large amounts of programmed information
6. Once started, microcomputers can operate by themselves

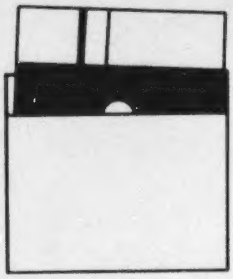
Disadvantages of Microcomputers

1. Microcomputers can not handle unprogrammed situations
2. Microcomputers are not efficient for one-time problems
3. Microcomputers can occasionally break down
4. Microcomputers are dependent on a power source and controlled environment

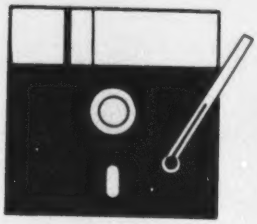
Handling a Floppy Diskette



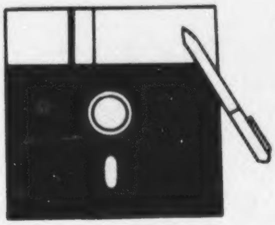
BE SURE TO INSERT CAREFULLY.



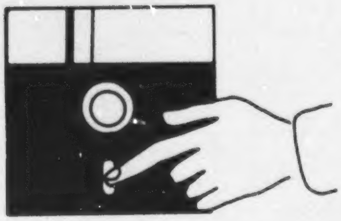
KEEP IN PROTECTIVE ENVELOPE



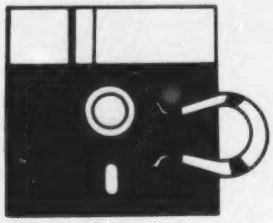
KEEP TEMPERATURE BETWEEN 50°F TO 125°F



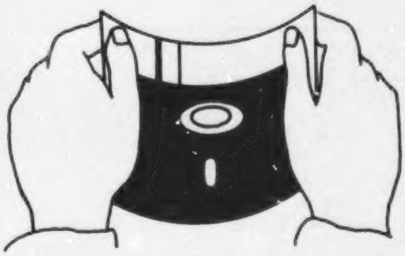
ONLY WRITE ON ENVELOPE WITH A FELT TIP PEN



DO NOT TOUCH DISKETTE



KEEP AWAY FROM MAGNETIC FIELD



NO BENDING OR FOLDING

SAMPLE TEST QUESTIONS AND TEACHER'S KEY

UTILIZING MICROCOMPUTERS IN HORTICULTURE BUSINESS MANAGEMENT

MULTIPLE CHOICE:

1. The three common languages used in programming computers include:

   a. Fortran, Basic, and Aramat.

   b. Pascal, Aramat, and Basic.

   *c. Fortran, Cobol, and Basic.

   d. Aramat, Pascal, and Cobol.

2. A program developed by a local computer specialist to calculate your personal business records would be considered:

   a. commercial software.

   *b. custom software.

   c. user-written software.

   d. none of the above.

3. The general program that is used to do mathematical manipulation would be:

   a. data base management.

   b. word processing.

   *c. spread sheet.

   d. graphics.

4. The smallest unit of information recognized by the computer is called a:

   a. microbyte.

   b. byte.

   *c. bit.

   d. kilobyte.

5. An example of a peripheral device for the microcomputer would be a:

   a. disk.

   b. byte.

*c. printer.

d. computer processing unit.

6. Which term is used to describe the physical components in a computer system, such as a keyboard:

a. computerware

b. software

c. systemware

*d. hardware

SHORT ANSWER:

1. Why do most programmers skip 10 or more lines between program lines?

So the programmer can go back and add lines to a program as desired; to make additions and correction in the program.

2. PRINT is the command used which will tell the computer to put information on the viewing screen.

3. List four questions you would ask before purchasing software.

a. Does the program provide the desired output?

b. Is the program free of errors?

c. Can the program be modified?

d. Are the commands easy to understand?

4. What are the advantages and disadvantages of writing your own program?

a. Advantages: less cash outlay

tailor to own needs

readily changeable

b. Disadvantages: time-consuming

may be expensive in terms of lost production

5. Write a simple program that would calculate the total price (P) for (G) number of pounds of grass seed purchased at (U) price per pound.

```
100  REM    The program will calculate grass seed price.  Dale
            Willy.  February 25, 1985.
110  INPUT  G
120  INPUT  U
130  Let P = G * U
140  PRINT  P
150  END
```

6. List four questions to ask before purchasing computer hardware.

   a. Does the model have sufficient memory for my needs?

   b. Does the model have adequate graphics capabilities?

   c. Is the picture clear and sharp on the monitor?

   d. Are the keyboard keys clearly marked and easy to read?

MATCHING:

Column I

D 1. The command used for a program line that serves as a reminder about the program or its components.

G 2. A command used in a program line that allows the program user to insert information into the program.

B 3. Computer programs purchased by the user to perform particular functions.

A 4. A standardized microcomputer operating system.

E 5. Controls the basic operation of the computer and its peripherals.

H 6. A group of eight bits; one character.

J 7. Example of a peripheral device.

K 8. Major component of a computer system housed inside the keyboard.

Column II

A. Control Program for Microcomputers (CP/M)

B. Application software

C. LET

D. REM

E. Operating system

F. Programming language software

G. INPUT

H. Byte

I. Kilobyte

J. Printer

K. Computer Processing Unit

L. Cathode Ray Tube

M. Mainframe

TRUE or FALSE:

False 1. The "in-use" light should be on when removing or inserting a diskette into the disk drive.

False 2. If line 120 in a computer program is entered into a program after line 140, line 120 will be read by the computer after line 140.

False 3. The RUN command will list the program lines on the screen.

True 4. A compiler will run a program more quickly than an interpreter.

False 5. Microcomputers can quickly handle large amounts of unprogrammed data.

True 6. A floppy disk is a magnetic device used for memory storage.

True 7. Impact printers use regular paper and have excellent quality of type.